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BRIEFLY TOLD.

OBITUARY, GENERAL JAMES JOURDAN.—In the death of General James Jourdan, President of the Brooklyn Union Gas Company, whose taking away was recorded in the JOURNAL for the 7th ult., and whose demise occurred the morning of the 1st ult., Brooklyn borough lost a man who had done much for her advancement, and whose fame in her political, business and social annals was hardly exceeded by that of any other man in the local history of that borough. Not alone did Brooklyn thus lose a marked citizen, but in his death the State suffered the cutting-off of a man who had quite a lot to do with many important business ramifications, and a Nation lost a soldier who had given to it service and counsel. Born in a small town in New Jersey 79 years ago, by far the larger part of his life was spent in Brooklyn, to which place his parents removed in the late 40's. He was not raised in luxury, but early had to make his own way in the world, and that he surely did. Always enamored of a soldiers life, he joined Company A, 14th Regiment, as a private soldier, and was subsequently promoted through the grades of non-commissioned officers to that of Adjutant of the Regiment. Having served perhaps a year as Adjutant, he was elected Major, under which ranking he entered the Union Army in the spring of 1861; his regiment was assigned as a branch of the corps to defend Washington, and in December, 1861, he was promoted Lieut.-Colonel of the 56th N. Y. Volunteers. It was in this service that he participated in General McClellan's Peninsular Campaign, in 1862; in 1863 he was assigned to the command of a Brigade in the 18th Army Corps; in 1864 had charge of the Military District of Beaufort, N. C., and in September of that year was promoted Brigadier General by brevet. In the following year he was brevetted Major-General for gallant and meritorious services in the field during the war. This record is merely cut to bare date, but it is sufficient to show that his service to his country was practical and positive, and that he was personally engaged in several of the famous battles of the war. At the close of the war he returned to private life, although his affiliation with things military remained prominent in his course, until 1880, in which year he resigned the position of Major-General commanding the Second Division, N. G. S. N. Y. It was about this time that capitalists, who were backing the scheme to introduce the manufacture of water gas in Brooklyn, were very active. The McLaughlin regime had just then received a severe setback in the defeat of their Mayoralty candidate, and things were going awry with his followers. The political mix-up was little short of a revolution. In any event, the Republican State dynasty of Tracy, Dutcher and Jourdan was in the ascendent, both in Albany and Brooklyn. Not slow to force their advantage, special terms were made under which the promoters of the Fulton Gas Company eventually joined hands with those who were behind the Municipal Gas Company, forming the Fulton-Municipal Gas Company, which concern virtually can be said to have smashed the close control that had been had over the gas industry in Kings county by the McLaughlin contingent for many years. It was largely owing to his cleverness and tact that existing differences between the various gas companies in Brooklyn (about 1884) were settled and the same worked into a whole. The General seldom visited the meetings of the Associations concerned in the conservation and advancement of the gas business; but, strange to say, he advised his own sons to not only become affiliated with such Associations, but to attend their meetings, etc. To mention the General's other business relations, none of which were honorary, in the sense that no labor attached thereto, would be like going over the roster of the banking, railway and construction companies of the State. To all these important interests he gave due heed and attention. That his trusts were perfectly administered goes without saying here. And it may here be noted that, clear cut and severe as he was on first scrutiny, no gentler-hearted man ever lived, as could readily be attested by the hundreds who bountifully benefited

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by his unostentatious charities. The writer knew General Jourdan for well nigh half a century, and here bears testimony to the calm, clean, straightforward work which ever marked his ways. He is survived by his widow and four sons, two of whom have made their mark in no uncertain way in the gas business in Greater New York. The funeral services were held in his late home, 174 Washington Park, Brooklyn, the afternoon of the 3d ult., the services being conducted by the Rev. Dr. Andrew Magill, Pastor of the Reformed Church of the Heights, a most touching feature of the solemnities being the presence of scores of the rank-and-file of the veterans, whose allegiance to their comrade was that of years of fealty.

CURRENT MENTION—

IT would be well for those who would speedily put the blame for the horrible accident that happened in the Grand Central Terminal Yards in this city last week, to wait the official investigation. Nothing could be gained by attempting to say who or what was at fault; but that dynamite was an important factor all the portents of the explosion go to show.

MR. E. C. WHITE has resigned the position of Eastern Sales' Agent for the Western Gas Construction Company, in order to assume the management of the estate of a deceased relative, whose home was in Fresno, Cal. We are sorry he stays West; good luck to him, nevertheless.

OUR issue for the 12th inst., p. 1126, at close of second paragraph, in a communication from "J. M. B.," Los Angeles, Cal., the author is said to have written, "There are other places where both natural gas and artificial gas are served, but not on nearly so large a scale and with such a positive *burning* of bridges." Naturally our correspondent finds fault with the italicized word, for, as he says, in concluding the correcting communication now at hand, "We do not burn bridges behind us; instead, we build bridges to cross over." The word should have been "*retaining*" instead of "*burning*."

ANOTHER properly lodged complaint comes from Messrs. H. M. Byllesby & Co., of Chicago, who write as follows, under date of the 16th inst.:

To the Editors AMERICAN GAS LIGHT JOURNAL: We quote from the AMERICAN GAS LIGHT JOURNAL, November 28, 1910, p. 1043:

"Work on the new gas plant (which the Northwestern Corporation controls) at Eugene, Ore., is underway. It is reported that this construction in its entirety will require an expenditure not far from $100,000; but to one located at this distance from the scene of action, it is hard to figure where that sum is at all necessary. It may be, though, that the Corporation is figuring going into the thing on so large a scale that no further expenditure in the next quarter century will be necessary."

You are probably not aware of the fact that H. M. Byllesby & Co. have recently purchased the properties of the Northwestern Corporation, operating at Eugene, Springfield, Dallas, Corvallis, Albany, and intermediate communities in the Willamette Valley. The article quoted is sarcastic, to say the least, and has already done us some injury. We feel that there was no intention on your part to harm anybody; but we feel that before publishing such an article you should have investigated the facts in the matter, which are as follows:

Eugene, and the smaller communities around it now have a population of 18,000. It is growing very rapidly. The old gas plant served less than one-half the population. The works were inadequate and in bad state of repair. Immediately upon acquirement of the property we began to put it in good operating condition, extended and replaced the distributing system, the estimated cost of which will not exceed $75,000. Yours very truly, H. M. BYLLESBY & CO.

[It is regrettable that the offending communication should have appeared in print, and no line thereof would have appeared had we known that the main parties in interest were Messrs. H. M. Byllesby & Co., and that was evidently the belief of our correspondent. However, it is our pleasant task here to say that the successors to the Northwestern Corporation, in the actuality of the Byllesby corporation, are of the sort that spare no expenditure to put things in good working shape in their various plants. On the other hand, such expenditures by them are an interminable distance from the profligate, in that their engineering staff is composed of members whose idea of the factor of safety is well in line with the best possible modern practice.]

WE understand that Mr. J. C. Elston, Jr., of Detroit, Mich., has purchased a controlling interest in the Chickasha (Okla.) Light, Heat and Power Company. Mr. Elston is prominent ly connected with the Detroit and Suburban Gas Company, and is also largely concerned in other gas and electric enterprises than those named.

MR. A. G. RAWSON, writing from Sacramento, Cal., the 12th inst., says: "Even though it seems late to make mention of the matter, perhaps a line or two respecting the situation at Salinas, Cal., may not be amiss. A few evenings ago Messrs. B. F. Pearson and F. G. Baum, representing the new capital that recently took over the Monterey County Gas and Electric Company, entertained a number of representative business men and city officials, the entertainment consisting of quite an elaborate dinner that was served in the Abbott House. At the close of the material portion of the feast, Mr. Pearson reviewed the work that the Company's officials had arranged for, such work being modeled on plans which virtually meant the reconstruction of the plants. He referred naturally enough to the action pending before the City Council looking to the calling of a special election, which contemplated the issuance of bonds, the proceeds of such issue to be used in getting ready for a gas supply to be fostered on municipal account. He stated that the main object of the function was to ascertain if the property owners in Salinas would give the new Company their support, the continuance of such support to be contingent on the nature of the service that was being given by the new men in the old Company. Mr. Pearson's well-put, temperate presentation was informally (but at length) discussed; and the burden of the discussion was that the Company be neither condemned nor interfered with until its proprietors had been given ample time in which to demonstrate their ability and expressed wish to bring the plants and the service therefrom up to every essential need of the residents of Salinas."

A CORRESPONDENT in Baltimore, Md., notes that the agitation for dollar gas, originally started by Mayor Robert E. Joyce and some of the members of the Town Council of Mount Ranier (a suburb of Hyattsville), looks likely to infect other districts or communities and which the Hyattsville Gas and Electric Company operates. In fact, the Mount Ranier opposition has crystallized to the point where Mayor Joyce, Attorney Wells and three citizens have been authorized a committee to make general complaint in the premises to the Marylend Public Utilities Commission. Prior to the positive presentation of the matter to the Commission the Committee will formally put the question of reduction to the Company. The latter has the right, under the charter issued it by the Legislature (session of 1903) to extend its mains within a radius of 15 miles of the named city for the purpose of supplying gas; and this is further backed by franchise of operation (Common Council, 1904), which declares that the rate charged shall not exceed $1.50 per 1,000.

SUBSEQUENT to a conference between Counsel, representing the Commissioners of the District of Columbia and the Washington Gas Light Company, the Commissioners have issued a statement explaining the concessions agreed upon by the Commissioners and the Company in respect of gas prices. The statement is: "In conformity with an understanding had at a conference between the Commissioners of the District of Columbia, the Corporation Counsel and Counsel for the Company, the Board of Directors of the Company passed a resolution reducing the price of gas to 85 cents per 1,000, the reduction to take effect on and after January 1, 1911. The understanding arrived at covers the following points:

"1. That the price of gas shall be reduced as above stated.

"2. That the Company shall, on and after the 1st day of January, 1912, make a further reduction, provided that an analysis of its accounts for the year 1911, operating on an 85-cent basis, shall show that the Company can make a further reduction without sacrificing its legal right to a reasonable return upon the fair value of the property employed in the conduct of its business. The Company further agrees that it will make and submit to the Commissioners such a statement as will qualify them to review the Company's operations, and give them such access to their accounts as they may think necessary for the purposes of verification.

THE proprietors of the Danbury and Bethel (Conn.) Gas and Electric Light Company have agreed to comply with the insistent demands of its customers in Bethel, that a branch office should be there opened. Mr. P. J. Garvin will have charge of the Bethel branch.

JUDGE J. W. OGDEN has ordered Mr. L. P. Boyle (of Chicago), in his capacity of Receiver of the Washington (Ind.) City Gas Company, to sell the same at private sale, at a price not to net less than $45,000.

Outdoor Lighting in England.—No. VIII.

[By Norton H. Humphrys.]

It is now more than 50 years since Mr. E. Price, of Hampton Wick, near London, lighted a district of 150 lamps by means of a controllable pressure device. It was described in a paper read before the Bristol Association of Gas Managers in 1869—see Proceedings, p. 18—and in the words of the inventor was a small instrument similar in appearance to an ordinary lamp governor, having an inlet in connection with the vertical service pipe, and furnished with a flexible diaphragm which is actuated by any additional pressure of gas in excess of that to which it has been weighted, thus giving motion to a valve which is above, not below its seat, as in the ordinary lamp governor, so that when the pressure is put on at the works the valve opens instead of closing and allows the gas to pass to the burner. In the chamber beneath the diaphragm an opening communicates with a very small jet burner for the purpose of supplying an igniting jet. This small jet, not being controlled by the valve, is constantly burning. When the pressure is put on at the works in the evening the valve opens and allows the gas to pass to the burner, which is instantly ignited by the jet. When the pressure at the works is reduced in the morning, below that to which the diaphragm is adjusted, the valve entirely closes and the gas is extinguished, the small igniting jet not being affected and remaining alight. The diaphragm is weighted to suit the pressure at each burner, and a small copper shield is used to protect the igniting jet. The saving in gas by the use of this appliance was put at 5 cubic feet per lamp per day, from which must be deducted the quantity required for the igniting jet, which was 3 cubic feet per day, leaving a net saving of 2 cubic feet per day or 730 cubic feet per lamp per annum. Taking the cost of lighting, extinguishing and cleaning at 12s. per lamp per annum, a saving of ⅔ was claimed, making a total saving of about 10s. per lamp per annum. The cost for each lamp would not exceed 7s. and the annual maintenance 3d.

Amongst the criticisms raised in the course of discussing the paper, it was mentioned that the hours of lighting and extinguishing did not necessarily synchronize with those of maximum consumption, and that many districts comprised two or more parishes or townships having different hours of lighting. On the other hand, full pressure might be required in case of fog or for testing mains at hours outside the lighting schedule. It is evident that the arrangement is not suited to the conditions of modern times, when the day pressures are little if anything below the evening, and that anything that caused a temporary reduction of pressure, such as starting a large gas engine, would put out the lamps in the neighborhood. Another point not mentioned is that most gas companies reduce to a minimum at midnight, and the lamps are usually required to burn till 1 hour before sunrise. The pressure from 12 to 6 A.M. is usually lower than in the day. Apart from that the arrangement seems capable of useful application for small districts, railways stations, large buildings, places of worship, etc., where it is required to turn the gas off or on from a collection of burners at frequent intervals.

Some years later, in 1877, Mr. A. F. Wilson, of London, read a paper on the subject of mechanical lighting and extinguishing, and described an apparatus of similar character, but having a mercury sealed cup in place of a flexible diaphragm, and also offering the advantage of extinguishing the igniting jet when the main burner was lighted. He claimed a saving of 13s. 6d. to 15s. per lamp per annum, and that the apparatus could be installed at a total cost, inclusive of interest and redemption fund, on outlay of about half that sum. The apparatus consisted of a small, concentric, cast iron tank, about 2 inches diameter, attached by a screwed socket at the bottom to the lamp service pipe, and contained in the lantern. The space between the concentric rings is a little over ½ inch wide, and holds sufficient depth of mercury to seal an inverted cup, which rises when pressure is applied in excess of the lighting limit, and falls when it is reduced below the extinguishing limit. To this cup is attached a governor of very simple construction, which secures a practically even consumption at any pressure between 8 and 30-tenths. There is also attached to the cup a tube which conveys the gas to the burner, and, rising or falling with the movement of the cup in a closely fitting outer tube, alternately supplies or cuts off the main light or the igniting jet. This is managed by means of three orifices and ringed indents in the tube, somewhat on the principle of the slide valve of a steam engine, the upper orifice securing the main light and the two lower ones the igniting jet. When the cup is at rest in the tank, the lower and smaller orifice in the tube is opposite a corresponding orifice in the casing leading to the jet, and a small igniting flame is maintained. When the lighting pressure is applied, the cup and tube rise, and the middle orifice is brought opposite to its corresponding aperture. This allows a full supply to the igniting jet, which is contained in a double shield or wind guard some distance below the burner, and causes a flash light to project and reach over the top of the burner. Before the flash light is clear the gas is admitted to the main jet, and the bell continuing to rise shuts off both orifices to the igniter, at the same time maintaining a full supply to the main burner. The lighting and extinguishing pressure is adjusted on each burner by an arrangement of levers with movable weights and counterpoises. The counterpoise is a variable lever weight that causes a difference in the lifting and descending weight of the cup, so that when at rest it is heaviest but gradually loses weight as it rises. There is also a cam and ratchet wheel and catch that retard the motion and prevent the same from being too rapid, and also holds the cup and appurtenances up when the pressure is reduced to a minimum, as at night. To extinguish, the pressure is momentarily raised to the maximum, which has the effect of throwing off the supporting catch, and leaving the cup free to fall, in the absence of sufficient pressure to sustain it.

With regard both to this and the preceding arrangement, while they are credited with the saving of gas due to not lighting up till the latest minute, it would appear that the lighting must be effected before the bulk of the private lights are turned up, which in dark and narrow streets would be appreciably earlier.

The next appearance of the automatic lighter was not till 1902, when Mr. W. R. Mealing, of London, came before the Gas Institute with an account of Gunning's apparatus for controlling public lights. The inventor of this system has worked for many years on this subject, and the essential features of the appliance described by Mr. Mealing are still retained, though improvements in detail have been introduced as suggested by experience. A large number of Gunning's controllers are in use to-day and giving satisfactory results. Unlike the foregoing, they are actuated entirely by clockwork, and are independent of the gas supply, and of each other. This has the advantage that any defect will affect one only, whereas with the controllable apparatus any difficulty with the supply pressure would influence the whole. Mr. Gunning is also able, by means of his arrangement, to reduce at midnight. If there is a cluster of three burners, and it is desired to turn off two at midnight or at 11 P.M., leaving only one for the remainder of the night, this requirement can be met. A special feature in Gunning's apparatus is a tap with the plug drilled with two passages, crossing each other at right angles. This enables the tap to turn on and off alternately by repeated ¼ turns in one direction. There is a brass disk pierced with holes at regular distances on a circle near the circumference, representing hours and half hours, and two movable pointers that can be set to any time by means of a projecting pin that engages in the holes. The clock is wound once a week, and the time set forward or backward according to the season of the year. If the midnight reduction is required a third pointer is provided. There is a star wheel on the top with eight points, so placed that the pointers engage with it and give the tap a ¼ turn in clearing. For the midnight reduction a different form of plug is fitted to the tap, and the star wheel has six points instead of four.

Mr. Julius Norden, of London, is supplying a simple form of distance lighter invented by two German engineers, and known as the "Gascho." By its means the lights can be controlled from a center station by a momentary increase of pressure, which need not exceed 6-tenths. It is applicable to single burners or clusters, and to partial as well as total lighting and extinction. Below the burner is a flexible diaphragm valve, and connected with the upper part is a small arm which, in rising or falling with the motion of the diaphragm, engages with a cog wheel of special design that is fixed on the plug of the tap. For single burners the cogs are equi-distant, and for partial extinctions are arranged to suit the purpose desired. When the pressure is increased the valve rises, the cogwheel is rotated, the gas turned on and lighted by a pilot jet of the usual character. A similar increase shuts the gas off. The actuating pressure can be adjusted to suit local requirements by means of small disk weights. The mechanism is covered by a white enameled cap and is out of contact with gas, and the whole is exterior to and independent of the ordinary gas supply to the burner, which passes through the tap exactly as in the case of a non-mechanical arrangement. The apparatus is only actuated by an instant increase of pressure to the extent named, and

variations in the pressure will not interfere with its action. Both burner and pilot jet are fitted with regulating screws.

A special feature of the "Automaton" lamp controller is that it combines a controllable pressure device with a clockwork action, somewhat similar to that of a striking clock, for actuating the tap. This means that the pressure wave, instead of having to rotate the plug of the tap, simply liberates the clockwork. Having less to do, the diaphragm can be smaller and the actuating pressure less. In order to provide for lighting or extinguishing at abnormal times, the mechanism can be started by pressing a small knob outside the case, and this without interfering with the usual working. The clock simply gives the tap a quarter turn and then remains quiescent until a second impulse is given, and as it is only working for not over 15 seconds at each operation it does not require winding oftener than once in 4 to 6 months. Like the foregoing, the whole of the mechanism is outside of the gas way. There are weighted levers to be adjusted to the actuating pressures, and the appliance is entirely independent of variations below these limits. With this apparatus it is claimed that part of the district may be extinguished at any desired hour, say 12 P.M., and the remainder at daybreak, or that every alternate lamp could be put out at midnight and the remainder at dawn. The lighting pressure must be 4-tenths or 5-tenths in excess of the maximum evening pressure, and the extinguishing pressure a similar quantity in excess of the maximum morning pressure. The mechanism is capable of some modification to suit special conditions, such, for instance, as when the lighting business takes up before the schedule time for lighting the public lamps, and it is impossible, with the full draught on the mains, to get the excess pressure.

In all these arrangements the pilot jet is shut off immediately after the burner is ignited and turned on just previous to the extinction, so that the pilot is only burning during the hours outside the schedule time.

Mr. A. E. Broadberry, Engineer of the Tottenham Gas Company, finding that a predetermined pressure cannot always be guaranteed, has designed an apparatus that is not dependent on that condition, but that will adjust itself to variable pressures, and further will differentiate between the comparatively slow variations caused by continual alteration in rate of consumption and the suddenness of an intentional increase. In other words, whatever the pressure at the lamp, so long as it is sufficient for the requirements of the burner, a 5 tenth intentional rise will light the lamp. All the working parts are outside of and independent of the gas way, and an electric ignition, actuated by a small dry battery cell at each lamp, can be supplied. The apparatus comprises a valve box containing a large floating bell, sealed in glycerine, and an operating box containing the mechanism for turning the tap.

It will be obvious that these details only give some idea of the principal distinctive features and are not a complete description. Full details, if required, can easily be obtained from the makers. And, further, that I have not attempted anything like an exhaustive description of the various devices on the market, but simply endeavored to indicate the lines on which work has been done and which go to prove that a self-igniting and reliable apparatus is well in sight. The "Bamag," the "Rosten," the "Alder & Mackay," the "Kirkham, Hestell & Chandler," are other makes that come to mind as I write.

[Official Report—As Appoved by Committee on Publication.—Continued from page 1185.]

THE FIFTH ANNUAL MEETING, AMERICAN GAS INSTITUTE.

Held in New York City, October 19th to 21st (Inclusive), 1910

First Day, Wednesday, October 19th.—Afternoon Session.

Discussion on the Morehead Paper.

The President—I think all are pleased with Mr. Morehead's paper. I should like some gentleman, who feels competent to do so, to discuss it.

Mr. Fulweiler—I wish to compliment Mr. Morehead very much on the vast amount of valuable information that he has gathered for this paper, on a subject which I think many of us feel does not receive the attention that should be given it in the gas business. Two or three points Mr. Morehead has either omitted or not put just the way I should like to see them, and I should like amiably to differ with him on a couple of them. In the first place, he says that this paper may be used as a text book; if so, I do not think he has been quite fair to the Hempel apparatus, because the illustration of the form of the Hempel apparatus which he has given is archaic and probably does not exist outside of a museum. I do not believe anyone has ever used it for the last 20 years, and it does not bear any more resemblance to the modern form of Hempel apparatus, with the manometer tube and the jacketed burette and the 3-way cock, so that the KOH bulb can be attached, than the very modern form of apparatus which Mr. Morehead has shown here resembles its originator. With modern Hempel apparatus, such as I have described, analyses to the extent which Mr. Morehead has also described here, can be made in about equal time, and some people think with considerably more accuracy and with considerably less slop due to wash water in the chemicals. I just bring that up in passing, because I think that the Hempel apparatus, while it has some disadvantages, is still a pretty good form of apparatus for general work. Another point, going on into the discussion of illuminants in the constituents of the gas, Mr. Morehead rather would lead the uninitiated to consider that ethane represented the illuminants. I find no mention at all of benzol in the illuminants. We have always felt that the value of the illuminants was to a very considerable extent due to the benzol vapors carried, and I think, in a paper that pretends to be a text book, benzol should be spoken of, as it is decidedly important. In considering the oxygen, and the reagents which are best adapted for its determination, Mr. Morehead thinks that an alkaline solution of pyrogallic acid is best for this purpurpose. I differ with him on that, as the action of the pyrogallic acid solution is a bit indeterminate, and unless you repeat back-and-forth, and test it, it is very difficult to tell when it is through. On the other hand, phosphorus is absolute in its action, and by the color of the vapors you can tell when the action has ceased. Moreover, it has the very valuable characteristic that traces of illuminants, which could not be determined in any other manner, can be determined by the absence of the sudden flash of vapors when passed over the phosphorus before passing into bromine. I think that is a very important point. It frequently becomes of importance when you are looking for traces of illuminants in gas. In the first part of the paper he speaks about the determination of hydrogen by its combustion through its action on palladium. He says that hydrogen is absorbed by palladium, but later corrects that and speaks of it as being a method of combustion. I think it would be well in a text book to have the explanations correct throughout. Mr. Morehead speaks of the influence of ethane as affecting the analysis when the analysis is determined merely by explosion, and says its effect is negligible. I don't think he ought to let the would-be gas analyst of the future go along with that idea in view, for he should be told that ethane has a very important effect, because if you will consider a gas mixture that contains actually 30 per cent. hydrogen, 12 per cent. methane and 4 per cent. ethane, analyzing by simple explosion, you will find that the analysis would come out 26 per cent. hydrogen and 20 per cent. of methane. This might lead to considerable differences in the interpretation of the analysis. While it is true that, regarding the calculated calorific value, this makes but little difference, it is merely proof of the fact that the coincidence of observed and calculated calorific values does not prove that the analysis was correct. It is not necessary to go through all the work of absorption to determine calorific value by analysis or by chemical methods. You can simply mix the gas with oxygen or air, then explode it, and by the oxygen absorption determine very closely the calorific value. Again, Mr. Morehead says that KOH pure by lime is better for use than KOH by alcohol. I think it would be well to state that you should not use KOH by alcohol, if you expect to get accurate results, as some action takes place there in the hydrocarbons left in the potassium hydroxide, which would entirely destroy the accuracy of the analysis. There is a very interesting thing here. Mr. Morehead speaks of the determination or identification of sewer gas by the H_2S present. That is a most interesting fact, and I would like to ask Mr. Morehead whether he has any data, or knows or thinks of any case that the courts would accept that test as identifying the presence of sewer gas. Cases are known in which it would have been extremely interesting if we had had a method by which we could positively state that sewer gas was present in a certain gaseous mixture. I do not know of any tests that are very accurate, and I should like to know whether he thinks the courts would accept that method. There is another point. The absorption of carbon monoxide by the acid cuprous chloride solution, I think, in general, is held as somewhat of a mechanical effect, therefore, it is theoretically impossible, even with the perfectly pure, fresh cuprous

chloride solution, to absorb all of the CO. You come to an equilibrium in which, for instance, if you take a solution that has been used and put a little air in it, you can get a carbon monoxide solution, and *vice versa*. Therefore, in all analyses which do not combust the gaseous residue from the absorption over palladium will thus determine the carbon monoxide as CO, and that corrected, you are liable to an error in the explosion. It seems almost impossible to get it out. Generally with coal gas the correction in the residue will be about ¼ per cent. of CO, and in water gas, with 4 times as much carbon monoxide as originally present, the correction factor and correction constant will run up to 2 per cent. sometimes; in fact, it will frequently run to 2½ per cent., and I think it would be well to call attention to this source of constant error. Again, speaking of the determination of hydrogen by combustion over palladium chloride, Mr. Morehead speaks, first, of determining the hydrogen and then excluding the balance. Ordinarily I think we have found it much more accurate to determine that in one sample of the residue, then make the explosion from a sample that has not had the hydrogen removed, because your results on exploding simply the mixture of methane, which is full of nitrogen, would seem to be not nearly as accurate as when you make an explosion containing the hydrogen; you get a much better explosion. Regarding interpretation of the data, I think the standard or average analysis which Mr. Morehead has gotten up, and the interpretation to be derived from these, are certainly of great interest, but in those interpretations I am free to confess I believe that judgment has a great deal to do with it, and on many of the points I do not agree with Mr. Morehead. Of course, I admit that these standard analyses were made with Mr. Morehead's type of instrument, which gives, as I have shown, some different values, for, let us say, hydrogen and the methanes, and that may influence the interpretation; but otherwise I think a great deal of judgment has to be exercised in the setting down any hard-and-fast rule as to the interpretation to be derived from your analysis—not that I do not think they are of great interest and of great value. But I think they should not be followed too blindly. One very important thing I think Mr. Morehead omitted from his paper is the fact that it is fairly easy, after a man has spent a year or so in making gas analyses, to obtain a fairly close analysis, but it is extremely difficult to get your sample. It is a trifle like the old recipe for hare soup, which says, "First catch your hare;" and I think the gas analysis in its most important part is, "First get your sample." They have been trying for a number of years to come to an agreement as to a standard method of getting flue gas samples, and I think no one will admit he really believes that the sample of flue gas he gets by any of the ordinary methods is a true sample. It may and it may not be, so I think he should call the attention of the would-be analyst to the extreme difficulties which have to be faced in getting anything that even resembles a true sample. Furthermore, I think he should not be allowed to think that analyzing gas is something which can be done easily, after reading a paper or a book, or seeing someone do it. Probably the first 3 months a man works at gas analysis he may think he knows how to do it, but the next 3 months he begins to realize there are some difficulties, and after he has been doing it about a year he begins to think that some day he will learn to be a gas analyst. I do not think a man should be allowed to go away with the idea that it is easy. It is probably one of the most difficult pieces of chemical or of analytical work that anyone is ever called upon to do, and unless a man keeps his hand in day-after-day and week-after-week, I personally do not believe his analyses are worth the paper on which they are written. They may look all right, but there is a great deal of doubt in everyone's mind about them. Another thing I think Mr. Morehead might have included is, in his bibliography here I notice he has a great many methods of gas analyses and books on gas analyses. I am familiar with, I think, practically all of them, but it is my personal opinion that the most valuable paper on technical gas analyses that has ever appeared has been entirely omitted. I mean modern technical gas analyses, the way we really do it, and that is the paper read by Mr. E. H. Earnshaw, on the "Chemical Analysis of Water Gas," which appeared before the Franklin Institute in 1898. I think that paper contained the basis of the most accurate commercial or technical methods of gas analyses that have ever appeared.

The President—Gentlemen, your applause signifies you have all been interested in Mr. Fulweiler's analysis of Mr. Morehead's paper. Does any other gentleman care to speak on the subject?

Mr. C. W. Hinman—If this paper is intended as a handbook for young gas analysts, I should like to say a few words on the subject. The first criticism I should offer would be that the paper seems to make it appear that gas analysis is quite a simple proposition, when you know how; but some of us who have been at it 30 or 40 years do not know quite how yet. I think, with any of the apparatuses described, that what we may call the absorption analyses are quite fairly accurate. For example, carbon dioxide, illuminants, oxygen, and the subject of criticism that has just been made, carbon monoxide. I think the preferable way in absorbing carbon monoxide is to use two solutions, and give it a good, long soak, then you can come pretty near; but when you come to determine hydrogen, methane and, more especially, nitrogen, by the ordinary water apparatus, I think you have to do it with extreme care, and the nitrogen is apt to be faulty. When I wish for accuracy I use the method of Bunsen and the apparatus of Williamson-Russell. I used it 30 or 40 years ago. It is quite costly, fragile apparatus, and it does not take so very much time; but using that apparatus and using mercury as a seal, I and my assistant made three analyses of illuminating coal gas, and the greatest variation in any constituent was about a ¼ per cent., and most of them were within a $\frac{1}{10}$ of a per cent.; but this mercury apparatus is delicate to be used in ordinary routine work. When you come to determine the methane, for example, by explosion, using water as a seal, you have to be very careful, or the water that seals the apparatus will absorb the carbonic acid formed, and so you get totally erroneous results. And perhaps as important a criticism as I could make would be on the determination of the calorific value from the analyses of gases. On page 4 are given some co-efficients for illuminants. These vary from about 1,900 to 2,250. Now, to arrive at any fair determination of the calorific value of illuminants, it is only necessary to know something of the constitution of those illuminants. For example, ethylene, as I recollect it, has not half the calorific value of an equal volume of benzol vapor, and still it has the same volume. I am speaking without notes, and so do not know just what it is, but know that it is something like that. Perhaps there are even greater discrepancies. So it is absolutely necessary to know something about the constitution of the illuminants. Mr. Jenkins, State Inspector of Gas of Massachusetts, attempted to do something in this line by analyzing the gas, and in one of his analyses of illuminants he determined the amounts of carbon and of hydrogen in the illuminants, and, using those figures, he was enabled in a large majority of cases to come very close to the determination by the Junkers calorimeter. There were one or two determinations where the result was somewhat different, but, generally speaking, they were as near as you could ask. It is much easier, instead of having the two analyses to be required by the mercury apparatus, to use the Junkers calorimeter in the first place. The only other criticism I have to make would be, his sample of coal gas, given on page 50. It is not a fair sample of the coal gases I have been accustomed to analyze. Carbon dioxide is given as 2½ per cent. Hydrogen is lower. I have a memorandum of my recent analysis of the gas at Lowell, which was somewhat different from that. I will read it if you do not mind:

Constituents.	Per Cent.
Carbonic acid	0.07
Illuminants	4.06
Oxygen	0.00
Carbon monoxide	7.08
Hydrogen	52.95
Methane	32.24
Nitrogen	0.60

Less than 2 per cent. You will notice that the nitrogen given in Mr. Morehead's paper is 5½ per cent. I am inclined to think that that is partly due to the faulty method of analysis.

The President—Mr. Hinman has given us some further light on this paper. Is there any other gentleman who would like to discuss the subject?

Mr. C. J. Ramsburg—I think Mr. Hinman and Mr. Fulweiler have gone a little too far in their estimate of the difficulties and long study to be expected in preparation for exact gas analyses. I do not by this statement mean to say that it is an easy matter, far from it; but the development of an analyst on this class of chemical work is largely a matter of personal aptitude and previous training. If you secure a man, a student from one of our universities, who is by nature careful, such a man can learn gas analyses in a comparatively short time. To expect a man of no training in the handling of chemical apparatus to learn gas analyses is to await the miraculous. The help in the operation of a works by gas analyses is very great, and it is to be deplored that more engineers are not taking advantage of it. There are several points in regard to the interpretation of analyses data in Mr.

Morehead's paper which I think will bear some discussion. Mr. Morehead has left the impression (page 60 of his paper) that the analysis of a 24-candle power water gas will show, when the operation is efficient, about as he has shown. This is apt to be very misleading. The analysis of gas of such a candle power will vary within wide limits with maximum efficiency, according to the kind of oil being used on the water gas set. To-day in this country there are many classes of oil being used: Paraffine oils from Pennsylvania and Ohio; semi-paraffine oils from Kentucky, Kansas and Oklahoma; asphalt base oils from Texas and California. Each and every one of these classes of oils will show a different analysis of a 24-candle power of the highest possible efficiency. For example, after many years of experience in this matter, I could not interpret this analysis from an oil efficiency basis unless I knew thoroughly the character of the oil used. If this gas had been made from Pennsylvania oil, it can be easily shown that the candle power per gallon was very poor; on the other hand, if made from Texas oil it might not be so bad. There is no doubt that the analyses of water gas can be made of great assistance to the engineering force, but the data used in their interpretation must be built up from the clear understanding of the character of oil used, and is made up largely from study in the plant where that oil is in use. On page 63, Mr. Morehead says, "An excess of methane means a low or dirty fire, or too little steam, dirty checkerbrick or overload on a cold machine." I should like to ask him if he will not explain that a little; also, "A deficit in illuminants shows an excess of blue gas or too little oil." These statements are worthy of more attention if we have time, and if this paper is to be considered as authoritative.

The President—Mr. Ramsburg has given us some more light on this subject and added a little more to Mr. Morehead's responsibility. Are there any other gentlemen who would like to speak?

Mr. Mueller—There are one or two criticisms which I should like to make on this paper. Speaking of the effect of CO_2 on the candle power of illuminating gas, I think the figure between 2 and 4 per cent. of CO_2 is, however, too low. I think between 6 per cent. and 8 per cent. would be more nearly correct. Speaking of oxygen, it is said: "The mixiture of pure oxygen with gas would give a sharper, keener explosion in the gas engine, would give a higher candle power." This is contrary to some tests which I have made which showed that the mixture of oxygen with gas is even more detrimental than the mixture of nitrogen or air. Referring to the effect of air on candle power. I think the figures are a littla too low.

Dr. Elliott—Mr. President and gentlemen: Mr. Ramsburg accused me of making a gas analysis complicated. I deny the allegation. I have aimed, ever since I have had anything to do with gas analysis, to make it simple, and I think the method which I have followed the past 30 odd years and its general use are in favor of my plea. I am not going to state the particular apparatus that I am an advocate of against the Hempel apparatus. I am very well satisfied that the Hempel apparatus will beat it for very fine work, but for rapidity I will set it up against Dr. Morehead and all the rest of them. All the modern apparatus he mentioned, with regard to the absorption of the various kinds of gases, are about equally rapid in hands that are used to them. I have taught a large number of young men how to do this, and am satisfied that one man likes one apparatus and another man likes another. It is immaterial to me nowadays which they use. I am very well satisfied with my own apparatus. With regard to some of the criticisms that have been made of the analyses: Mr. Fulweiler spoke of the presence of benzol. I agree with him. I don't think you can find a water gas made that does not contain benzol. I can always find it, and within the past year I have had an opportunity of making a number of tests. I did not determine benzol by any simple apparatus, but put it through fuming nitric acid, made dinitrobenzol and analyzed it, so I knew it was benzol; I was not guessing at it. That is a tiresome job; you cannot do it in a day or a week. For certain scientific purposes it can be done. I want to take exception to one of the speakers who says that pyro is not as good as phosphorus. I tried that many times and in my mind it is very hard to see the difference. Sometimes the phosphorus seems a little better than the pyro, sometimes the pyro will absorb oxygen better than phosphorus; but it is pretty hard to choose the better one when you are working in an ordinary way with rapid apparatus and you want to get results that the engineer needs right away. Now, with regard to samples, I agree with the speaker when he said it is very difficult to get true samples. The only way is to get a number of them. With regard to the explosion at the end: One of the speakers said that the nitrogen varied. I am afraid that that is due to the use of oxygen with the explosion. For some years I have omitted the oxygen in the explosion except the oxygen that was in the air. If you are careful to measure the air accurately, and do not use any more than the pretty nearly calculable quantity of air which you get from the first analysis, your nitrogen will come out very accurately. So that the difference in the analysis, or in its footing up, and the actual measurement of the nitrogen left in the residue after you get through, will coincide within a few tenths of a per cent.; but you must not use oxygen. If you do, you run the risk of exploding the nitrogen and getting nitrogen compounds. One thing about the carbonic acid and the water absorbing it after the explosion: I am afraid that is a good deal of a nightmare to some people. I have had a mixture of gas containing as high as 15 or 16 per cent. of carbonic acid stand over water in a gas burette all night with only a loss of 1 per cent. Now it stands to reason that while you are working at an explosion, and you end it up in the course of 15 to 30 minutes, there is not much chance for the absorption of carbon dioxide unless your apparatus changes temperature. Of course, I am assuming that the apparatus will not change temperature, and under those circumstances there isn't any fear of the carbonic acid being absorbed by the water, and it is not necessary, unless for very accurate work, to explode over mercury. I have seen parallel analyses made with explosions over mercury and explosions over water where the nitrogen would differ 1 per cent., but that is not very material. I would like to tell the story, if I may, Mr. President, of how it was I got up the simple apparatus that I have been using. I met the President a good many years ago; when I first met him he inveigled me into the gas business. I was a chemical manufacturer at that time, and I remember one of the first gas analyses that he gave me to do. I took the sample about 9 o'clock in the morning and I got through with it about noon, and he said, "What is this?" I said, "That is the gas analysis you gave me to do this morning." "Oh," he said, "That is no use to me now; I made a dozen since then." That took my breath away. I thought I was not going to be any use to him unless I could work quicker than that, and that night I devised the general principle of the apparatus that bears my name. I made many thousand analyses for him, and I am proud of what I have done and I always felt that our worthy President has always encouraged me along this line of work. I think the chemist is now coming to his own, and I hope you gentlemen will appreciate gas analyses, and if you will carefully study them, as you do some of the problems that are purely engineering, you will find great comfort in the gas analyses that you get from the chemists. And it is not so very difficult a job. A fairly, well educated man can get fairly expert at it in a few weeks, and in a few months he ought to be doing very satisfactory work.

The President—Who is the next one?

Mr. J. B. Klumpp—I do not want to spend any time criticising the paper, but I want to bring out a few points that I think were not emphasized sufficiently. My hobby is calorific value, and the title of this paper is the "Determination of Calorific Value from Analysis." From a number of reports of various companies received, Mr. Morehead quotes the heating value constants assumed for each gas. For the simple gases like carbon monoxide, hydrogen and methane, we are all agreed as to the constants to be assumed, and we are quite sure that our analyses give us the gas close enough to find the total heat put in the gas by each one of those constituents; but, as Major Hinman said, the analysis of the heating value given by the illuminants is from 200 to 300 heat units, and if you have not an exact analysis of the illuminants, and know what they are, you cannot assume any constant for them. I am afraid some of our members will use, for instance, the average value given in the 1908 report of Calorimetry Committee as the heating value of the illuminants. It, of course, depends entirely how and when the gas is made, and I do not think we can assume the heating value of the illuminants. I do not want any of our men to take an analysis and attempt to calculate the heating value and submit it for Commission work or Commission inspection, because they are likely to be anywhere from 20 to 50 heat units out; but if you are making gas under the same conditions every day and you determine that constant, using the same materials in a calorimeter, you can use it approximately for the next 3 or 4 days running on the same gas. But our gases are so changeable. If we are making a great quantity of water gas, the benzol and the ethylene are all determined on the same analysis, and the same figure (the heating value) is very different from benzol gas received from long distance where the candle power is determined by the high percentage of benzol. I want to impress the fact on the members that you can-

not calculate the heating value with any degree of accuracy from the analysis, unless you know absolutely the conditions where it is made. Do not attempt to try to use these figures for Commission purposes; they will do all right for your own work and for comparative purposes.

The President—We are obliged to Mr. Klumpp for his remarks. Is there any other gentleman who would like to speak on this subject? It seems rather a prolific one.

Dr. F. Schniewind—I was also very much impressed with the paper by Mr. Morehead, and wish to make a few remarks. In the first place, I was very much astonished at the great variation in the physical and chemical constants for the constituents of gas which were reported by the various gas companies. What is the reason for this? I believe the cause may, to a great extent, be found in that the various investigators do not report the sources from which they have taken these physical and chemical constants. I think Mr. Morehead would greatly add to the value of his paper if he made these public also, for only in that manner is it possible to judge as to the value of the physical and chemical constants given. In regard to the reports on the analyses, these are given in the form, as regards analyses, as the gas analyst obtains them in that report; in this way they are of very little use to the gas man. I would suggest that this report be changed and reported in the following rotation: First, the illuminants and the analyses of these, going into details, then report the benzols and their homologues afterwards, and the methanes and the homologues of that; second, which I believe would be in the order of their importance, methane, hydrogen and carbon monoxide; and finally the impurities, such as carbon dioxide and nitrogen and oxygen, which is of very little importance. Finally I want to say that, in the report on coal gas, Mr. Morehead says, "Carbon dioxide is generally due to leaks in the retort." That is hardly the case. We have found, for instance, that in the beginning of the carbonization of coal, when the retort is under the highest gas pressure, the per cent. of carbon dioxide is the largest. There the chance for inclusion of air from the outside is the least. The carbon dioxide is the product of the decomposition of the coal and especially is produced in the largest quantities in the beginning when the temperature is low. I should like to have also, in addition to the coal gas, seen an analysis of coke oven gas for comparison.

The President—Would any other gentleman like to make criticisms or remarks? If not, we will give Mr. Morehead an opportunity to clear himself.

Mr. Morehead—Your Honor, and Gentlemen of the Jury [laughter and applause]: I am glad to have one friend, who says he is pleased to see the chemists are coming into their own. The chemist has taken the horseshoe from over the door of the retort house [laughter]. The object of this paper is to try to give a little more scientific basis to the manufacture of gas; first, from the chemical analysis. When I started to write this paper early in the year, I outlined the method to some of the men in the laboratory in Chicago, who thought we would fill a holder with gas and store the gas until we were sure that the changes had stopped taking place, then we would make a series of analyses, by different methods and by different apparatus and by different chemists, to try to find which was the best for the small differences which did exist. In fact we made some analyses, using plain water and distilled water, and water saturated with air and water saturated with gas, but when I sent out these papers, and they began to come back, out of 220 sent only 31 reported regular gas analyses, I realized that they did not want anything about these fine differences in methods, but they needed to be told that analyzing gas is a good thing. With the exception of the United Gas Improvement Company, the Chicago people, and the Consolidated Gas Company, of New York, and the Companies attached thereto, the practice of gas analysis was really very limited; and when it came to discussing the difference between pyro and phosphorus for oxygen, the use of either one of them is infinitely better than not making any gas analysis at all. As to the gentleman who spoke for the Hempel apparatus, I think he will notice on page 5, it is said: "In the first class is Hempel's apparatus, which is perhaps the best known of the more accurate instruments. In experienced hands it gives excellent results, but the first cost is high, owing to the number of different parts it is liable to breakage, and a complete analysis by it requires quite a long time." The pictures given were some which were submitted from the manufacturer, but nobody would order a Hempel apparatus from these pictures, and it was merely diagrammatic in any event. I think most of the gentlemen did not get the drift of the intention of the paper. It is stated: "It is not the intention of this paper, nor within its scope, to suggest different lines or methods of gas analysis, or to suggest changes in the existing practice where such practice exists, or to draw comparisons between different designs of apparatus. There is practically only the one method, and it is quite sufficient. With any of the modern types of apparatus consistent and valuable results can be obtained." Now the rules which were given were those employed with the apparatus which we have had in use the past 6 years in Chicago. I wrote to some of the other gentlemen who are responsible for gas analyzing apparatus, asking them if they would send me the methods of analysis with their apparatus, that I should be very glad to incorporate them, but I did not hear from them. So far as to the question of exactness of these analyses given, I disclaim their accuracy in every case. It says, "The following figures are not given as absolute standards for all cases, but are averages of those figures which under certain local conditions obtain in the best practice." Now, there are four constituents out of seven in a gas, which influence the heat units. These are CO, methane, the illuminants and hydrogen. Now three of these you can get with accuracy. We have determined that—I presume most people who have experimented along these lines have—you can make each of those four constituents in a chemically pure state. You can determine them with a great deal of accuracy and they agree. Now the illuminants do not agree; they are never twice alike. They are not the same in the same gas or in different gases, and to get any kind of an agreement with the calorimeter, which I consider the standard, you have to make your analysis, calculate your heat units from the three that you know and establish your own constant for the four. By doing that, it says, rather distinctly, you will get a constant of your own which will enable your analysis to agree closely with the calorimeter. One gentleman thought it would not be well to take the value of the illuminants given on page 4 as an average. Now, instead of that I suggest, on page 67, that there are six different values for illuminants which are given. There are the illuminants which occur in Pintsch gas, in 28-candle power water gas, in 24-candle power water gas, in oil gas, in 20-candle power mixed gas, 16-candle power coal gas, natural gas, gasoline gas and acetylene gas. I find the proportion which would be absorbed by bromine and reported as illuminant varies in all of those cases, but these figures will give a very close agreement with the calorimeter, but it will not be right to take a constant for Pintsch gas with illuminants which would add 2,500 heat units and use it for natural gas whose illuminants would add about 1,500. You have to establish those for yourself and for the particular gas. Now, the other gentleman spoke of pyrogallic acid in the burette, saying that you wouldn't know when you have used enough. In the form of apparatus designed by Dr. Elliott, and the same in my design, you do not use the same chemical over and over; you use new chemicals all the time, the gas is stationary and the chemicals are poured through the sample. It is not like the Hempel or the Orsat-Lunge apparatus, where you put the gas back and forth through the same chemical. Mr. Fulweiler spoke of the article by Mr. Earnshaw not being mentioned. That is quoted fully in Abady's "Gas Analysts' Manual," which is mentioned in the bibliography. So far as saying acetylene does not occur in gas, it does. The very first mention of acetylene that I ever heard of—and I was at the birth of it—was a jug of alcohol at the Centennial Exposition in 1876. The alcohol was made from acetylene that came out of coal gas, and, until the discovery of calcium carbide in 1892, why that was about the only mention which you could find of acetylene. It does exist, but this is an analysis of the industrial gases; if the gentleman will look on the first of the page, he will see "Industrial gases." That does not mean the academic analysis of gas. You can go through a gas analysis and find almost anything. There is almost everything in the chemistry book under the head illuminants. If you want to go and look for them you can take as long as you want, but for industrial purposes, $\frac{33}{100}$ of 1 per cent. of any one constituent, does not cut much ice around a gas house. All of the figures which are given are at 60° F., and 30 inches of mercury, and based on a dry gas. As to sewer gas, I don't know what action the courts would take—I don't know that it has ever come up; but in the gas business you always hear two things. One man says there was an explosion. The gas man immediately says "Sewer gas." That is one of the first lessons in the gas business. All of the illuminating gas which is put out has been purified until there is no hydrogen sulphide in it. You do not get any stain—presumably. Sewer gas does contain a very large per cent. of hydrogen sulphide and I have often made that test with lead paper the same as is used in the purifying house, or with silver nitrate which is a little more accurate than lead

acetate. What action the court would take I cannot say, but it is a very good indication of the presence of sewer gas. The gentleman was right in saying that the absorption of CO by copper is mechanical. It is, but with this particular form of apparatus which I use, of the class of which Dr. Elliott's apparatus and my own belong, new chemicals keep going through the same gas and you can come very near seeing how far the absorption has gone. You ought to take a little longer with that, and the way people do ordinarily is to put the sample in the burette, put the copper chloride in the funnel and just crack the stopcock at the top and let it drain in, then take your photometer and when you get back the solution has had ample time to do all of its absorption. A large number of these analyses are taken from our own experience, and a number of them are checked up with the check analysis which the gas company chemists were kind enough to send us. So far as the exact analysis is concerned, where a man is making 7 determinations in 30 minutes, you cannot expect him to split hairs. There may be men who can make a gas analysis and get it to within $\frac{1}{10}$ of 1 per cent., but it would be history; you would get it day after to-morrow and your gas would be gone. There is the personal equation; there is no question about it. In almost all of the interpretations which show an excess of oxygen, it is said that there was perhaps carelessness in taking the sample, and care in getting your sample is something which cannot be overestimated. As far as the accuracy of the analysis is concerned, the Junkers' calorimeter gives you a good check. If your constants are correct and calculated out and agree with the Junkers, then your analysis is right; if they do not agree, one or the other is wrong. On the pages which are added in the back, you will find places for the calculating the heat units from the analysis. If a man will take the trouble for a week to establish his constant for illuminants, he can come very close to it indeed. As far as nitrogen in the end of the analysis is concerned, nitrogen is about the only thing in the group of chemicals which will stand the racket that the residue goes through with. It is treated first with an alkali and then with an acid, and then an explosion with pure oxygen, and what is left is bound to be nitrogen. There isn't anything else in the chemistry book that I know of that would stand all that grief. If you have a very rich gas, you don't want to use oxygen; take a gas as rich as acetylene, put oxygen in and explode it, it blows up your burette. The illuminants, as I have said, a man has to calculate for himself, but with these figures that are given here under the particular gas on page 76, you can come to a very close agreement with the Junkers, and where a man has two instruments, why use them? If you have both, you better stick to the Junkers; if you have the analysis, you can use one to check up the other. If you cannot pay $125 for a Junkers' apparatus, you better buy Dr. Elliott's apparatus, make your analysis and calculate from it! [Laughter.] Too much oxygen will unquestionably take candle power out of the flame just as too much air will, but a small amount of it will increase the candle power in an open flame. This paper says that Dr. Elliott's apparatus is perhaps the best known. I differ with the Doctor a little as to the time required for an analysis. I will take the Doctor on and analyze gas for the championship! The gentleman from New England spoke of the CO_2 in his gas; that I think at first when the heat is highest, would come from the air which is in the coal. His analysis which he gives of coal gas, with no nitrogen, practically no oxygen (only $\frac{6}{10}$ of 1 per cent.) is an awfully good analysis. I should say from that that he does not have enough oxygen for his purification. I don't know what apparatus he uses. The analysis of the exhaust from a gas engine will tell you a great deal. Flue gas analysis will tell you a great deal. When you have trouble with the gas engine and the gas bill is too high, you can go and get a sample of the exhaust, and maybe 5 times out of 10, certainly 3 times out of 10, you can find what is the matter with it. The mixture is wrong and the man that is running the engine does not know it until you make the analysis and tell him. In flue gas analysis, a man will take the analysis and look at it and tell you right away what the trouble is. It is real uncanny sometimes to see a man that is thoroughly familiar with it; we have men who look at an analysis like that and say, "Your superheater is too hot;" they get so familiar with some standard analyses, that when the analysis of any one gas does vary particularly they know why. I think that ought to get my sentence commuted.

The President—Gentlemen, I think we have no fault to find with Mr. Morehead.

On motion of Mr. McDonald a vote of thanks was passed to Mr. Morehead, the President remarking Mr. Morehead was entitled to a vote of thanks for bringing out so intelligent and valuable a discussion.

The President—We will now have the

REPORT OF NOMINATING COMMITTEE,

which was read by Capt. McKay, as follows:

The Committee nominates unanimously as follows:

For President—Donald McDonald, Louisville, Ky.
For First Vice-President—W. Cullen Morris, New York.
For Second Vice-President—J. D. Shattuck, Chester, Pa.
For Secretary and Treasurer—A. B. Beadle, New York.
For Directors—(to serve two years)—W. H. Africa, Manchester, N. H.; W. R. Addicks, New York; R. C. Dawes, Chicago, Ills.; V. F. Dewey, Detroit, Mich.; J. M. Morehead, Chicago, Ills.

ELECTION OF OFFICERS.

The President—Gentlemen, you have heard the report of the Nominating Committee. Are there any further nominations? If not, what is your pleasure?

Mr. Williamson—I move the report of the Committee be received and that the Secretary be instructed to cast one ballot for the names as recommended by the Nominating Committee. [Seconded.]

The President—Gentlemen, it has been regularly moved and seconded that the report of the Nominating Committee be received and that the Secretary be instructed to cast one ballot for the names presented. All those in favor of the motion will signify it by saying "Aye;" those opposed, "No." The motion is carried. The Secretary will cast the ballot.

The Secretary immediately reported that he had cast the ballot of the Association for the candidates nominated by the Committee.

The President—I now call upon the tellers whom I appointed this morning (Mr. Nettleton, Mr. Woodall and Mr. Miller) to canvass the vote and report.

Mr. Nettleton reported that the vote was counted and was cast as stated by the Secretary.

The President—Gentlemen, the tellers have reported that the ballot has been cast for the names presented by the Nominating Committee. That being the case, I declare them duly elected. If the President-elect, Mr. McDonald, is in the room, I am sure we should like to hear from him.

Mr. McDonald—Gentlemen, I can say truthfully that this honor is unsought and unexpected, but surely not unappreciated. I can honestly say that if all the Colonels in Kentucky were to get together and choose me as Governor of that State I should not appreciate it as much as to have been picked out by the men in my own line of endeavor to represent them for a year in the Chair, which has been held and made so illustrious by the men who preceded me. I am not vain enough to think that I have been selected on account of my great scientific attainments. If the matter were left to a competitive examination, as the Japanese and Chinese do, there are 400 or 500 men in this Institute who could fill this position as well, if not better. Your action simply means: "McDonald, you are a good fellow and we are glad to confer this honor upon you." I wish to say that I intend to do all I can to advance the interests of this Institute. If there are any cliques or factions in the Institute I do not know about them, and I have good friends among them all, I am sure. What appointments I make will be made without reference to them, and as far as possible for the best interests of the Association. If the various men who have the interests of the Association at heart will suggest to me men heretofore not prominent in its affairs, who will make good men for certain positions, I shall be glad to consider those men and consider them with an eye, not to confer personal favors, but with regard to the best interests of the Association. I thank you from my heart.

The President—Gentlemen, you have heard from the next President. I am sure we are all to be congratulated on his election. The First Vice-President, Mr. Morris.

Mr. Wm. Cullen Morris—Mr. President and Gentlemen, I am not very much on speech making, and I did not expect to have to make one. The only thing I wish to say is that I desire with all my heart to be able to help the newly elected President carry out the sentiments which he expressed just a moment ago.

The President—The Second Vice-President, Mr. Shattuck.

Mr. Shattuck—Mr. President and Gentlemen: I thank you for the honor you have conferred upon me. I shall do all I can to carry out the duties required of my office and assist Mr. McDonald in the programme that he has laid out.

SUPPLEMENTAL REPORT OF THE NOMINATING COMMITTEE.

The Nominating Committee send a request to me that they wish to submit a supplemental report. It is about the procedure of the Com-

mittee. If there is no objection we will hear from the Chairman of the Nominating Committee.

Capt. McKay—The Nominating Committee recommend that the Institute provide in its by-laws, or in amendments thereto:

1. That the Nominating Committee be designated at least 30 days before the annnual meeting of the Institute.

2. That the Nominating Committee be empowered to fill vacancies that may occur in its membership through declination, resignation or inability to serve in person. WM. E. MCKAY, Chairman.

The President—That involves, I think, a change in the by-laws or the constitution.

Mr. Forstall—I move that the supplemental report of the Nominating Committee be received and referred to the Directors for action. [Seconded.]

The President—It has been regularly moved and seconded that the supplemental report of the Nominating Committee be received and referred to the Board of Directors.

Dr. Humphreys—Is it possible to give the Directors power to act? If so, I would so suggest an amendment.

Mr. Forstall—My original motion, as made, was that it be referred to the Directors for action.

Mr. Morris—That is what I seconded.

The President—You moved that it be referred to the Directors for consideration, whether they have power to act or not?

Mr. Morris—If I understand, the intention of Mr. Forstall's motion was that action should be taken by the Directors.

The President—Shall we take it upon ourselves to tell the Directors what to do?

Mr. Morris—I think it is a function of that body.

Mr. McDonald—We can get a provision to do something without directing them what to do, ; a motion that their action shall take effect before the next meeting, instead of waiting until this can be voted upon by the next meeting.

Dr. Humphreys—It is not my intention to direct the Directors, but simply to give them the power to say yes or no.

The President—Section 57 of the Constitution, under the heading "Amendments," says that all propositions for adding to or altering any provision of the foregoing constitution shall be laid before the Directors, who, if they see fit, may bring it before the next general meeting of the Institute, and who shall be bound to do so upon the requisition in writing of any 10 members of the Institute. All such propositions shall be decided by ballot and require two-thirds of the vote cast for their adoption. As this, to my mind, involves a change, I should say the proper motion would be to refer it to the Directors for their action.

Mr. McDonald—These reports made on the floor are in obedience to the constitution or by-laws. If it is a by-law, it seems to me we can amend it in the way we have designated.

Mr. Forstall—The constitution merely says that, previously to each annual meeting, the Directors shall appoint a Nominating Committee; it says nothing at all about the length of time previous to it that they may have to appoint. This is merely a change in the by-laws, or possibly merely a change in the custom.

The President—(reading)—"Previous to each annual meeting it shall be the duty of the Directors to appoint a Nominating Committee of 5 members." Whether it shall be 1 year previous or 6 months is not specified.

Mr. McDonald—In order to carry out the idea that the Nominating Committee has put forward, I offer a resolution that it is the sense of this meeting that the report of the Nominating Committee should be made 30 days prior to the meeting.

Dr. Humphreys—I second that.

Mr. McDonald—*Appointment* of a Nominating Committee shall be made 30 days prior to the meeting.

The President—Do you wish to withdraw your motion?

Dr. Humphreys—I withdraw my motion.

The President—It has been regularly moved and seconded that it shall be placed upon the record as the sense of this meeting that the Nominating Committee for officers shall hereafter be appointed at least 30 days previous to the annual meeting. Are you ready for the question?

The question was called for and, upon vote, was unanimously carried.

Capt. McKay—The other recommendation is even more important, which is that the Nominating Committee be empowered to fill the vacancies in its membership that occur through declination, resignation or inability to serve in person.

The President—Gentlemen, we overlooked a recommendation of the Committee, that the Nominating Committee be empowered to fill vacancies that may occur in its membership through declination, resignation or inability to serve in person. Will you make that also a resolution as being the sense of the meeting?

Mr. McDonald—I don't agree with the idea that this resolution conveys. It seems to me it is just as well, if we appoint a Nominating Committee of five, and two of them cannot serve, for the remaining three to act without them as it is for those remaining three to choose two other men in their places, because it is just as easy to accomplish a certain object by three of them voting for what they want as it is to appoint two other fellows who will vote their way. In other words, every committee that has a quorum present can act. It seems to me the motion is unnecessary and unwise.

Capt. McKay—In explanation of some of the difficulties under which your Committee acted this year, we were very desirous of submitting a unanimous report. We felt that the composition of the Committee was representative geographically and in other ways of the Institute. Communication with San Francisco is somewhat difficult and we were, for that very reason, compelled to postpone submitting our report to the Institute at its first session. Now I believe that if the men who are placed on the Nominating Committee by the Board of Directors have been chosen with discretion by the Board, that they ought on the part of this Institute to be fair enough to fill the vacancies that may occur, fairly; and I do not think that you are giving them any undue power, and you are affording them an opportunity officially to settle the question of submitting the nominations to the Institute. If it be thought better that the Directors should act in this matter and fill the vacancies, that can be done, but it would be a very slow and tedious process. You cannot get the Directors together as easily as you can the members of a small committee of this kind. I am sure we should have been—or tried to be—perfectly fair in filling the vacancies. In other words, it should have been and would have been our intent to appoint or designate to fill those places men who, as nearly as possible, represented the same interests or the same purpose and locality; and I believe that any succeeding Nominating Committee would try to do the same thing. I do not think you are giving them undue power. We could have submitted a report signed only by the three, but we preferred to submit a report signed by all five, and I think that is the kind of report you want submitted on behalf of the Nominating Committee.

Mr. McDonald—Wouldn't it be a better idea for the Directors to elect a Nominating Committee and then elect 5 alternates, and choose those alternates in their order, in case anyone fails to serve or fails to show up? I do not think any Nominating Committee would want the responsibility of adding members to their own number.

The President—Is it not the case that all committees are governed by a majority? In a committee of 5, if 2 members are absent, the other 3 are a majority and can act.

Mr. McDonald—It has been expressed that the 3 might have a delicacy in acting, and if there were alternates selected they could act, and it would be just as easy to pick out 10 as 5, and let the 5 be the committee and the other 5 alternates. It is done in all political matters.

Dr. Humphreys—I move that the second suggestion be referred to the Directors for their consideration.

Mr. McKay—The Committee concur in the substitute resolution of Mr. McDonald. I think it would be the better plan to have the alternates elected and designated in their order, so that in case of absence on the part of regular members of the Committee they can be called in; but it is not the same as a majority report from any other committee; a minority report from the Nominating Committee means two tickets in the field, with corresponding trouble.

The motion of Dr. Humphreys was seconded.

The President—Gentlemen, it has been regularly moved and seconded that the second recommendation from the Nominating Committee be referred to the Directors for their consideration and action. Are you ready for the question?

The question was called for, and, on being put to a vote, was carried.

The President—I think Dr. Humphreys, as Chairman of the

BEAL MEDAL COMMITTEE,

is ready to report.

Dr. Humphreys read the following report:

Your Committee appointed to award the Beal Medal for the year 1908, beg leave to report that they have decided in favor of

WALTER HERBERT FULWEILER,

for his paper entitled, "The Physical Theory of Coal Carbonization."

It is only fair to the authors of other papers and the members of Committees reporting on technical subjects, to say that it has been found most difficult to come to a decision by reason of the high quality of committee reports and other papers submitted at the same meeting.

ALEX. C. HUMPHREYS,
WALTON CLARK,
B. W. PERKINS,
} Committee.

The report having been accepted, the President congratulated Mr. Fulweiler on receipt of the medal.

In response, Mr. Fulweiler said—Mr. President and Gentlemen: The honor is indeed unexpected, but as our newly elected President said, not unappreciated. I think one of the greatest rewards that can come to a man in the gas business is to feel that this Institute has honored him with its approval.

(To be Continued.)

[ABSTRACT REPORT.]

SIXTH ANNUAL MEETING, NATIONAL COMMERCIAL GAS ASSOCIATION.

HELD AT MECHANICS' HALL, BOSTON, MASS., DEC. 6TH TO 9TH, 1910.

FIRST DAY—MORNING SESSION.

The sixth convention of the National Commercial Gas Association was called to order in Paul Revere Hall, Mechanics' Building, Boston, Mass., at 11:15 A.M., Tuesday, December 6th, with President E. N. Wrightington, in the Chair. The President, on calling for order, remarked that it gave him great pleasure to welcome the visitors on behalf of the local gas companies, and hoped all would have an enjoyable visit. He was glad to see so many from a distance away from them, several of whom now came to Boston for the first time. He also exhorted the delegates to be prompt in attending the sessions, so that the programme could be properly followed.

On motion of Mr. Wainwright the roll call was dipensed with. It was also resolved not to read the minutes of the previous meeting, as the same had been printed in the proceedings.

AMENDMENT OF CONSTITUTION AND BY-LAWS.

The President announced that the next business was the amendment of constitution and by-laws.

Mr. Clark from the Committee appointed to make such revision presented the recommendations of the Committee. These were considered at length, and, upon motion of Mr. Graf (seconded by Mr. McLean) the changes suggested were declared adopted.

The next matter concerned the

INCORPORATION OF THE ASSOCIATION.

The next business had to do with the incorporation of the Association, which was outlined by Mr. McLean, who presented the following resolution:

Resolved, That the newly elected Board of Directors be authorized to take such steps as may be necessary to incorporate this Association under the laws of the State of New York, and that the newly elected Board of Directors make and file a certificate of incorporation for that purpose.

On motion of Mr. Clark (seconded), the proposed action was indorsed by vote.

The President—The next order of business is the report of the Board of Directors. The Secretary will read the report.

Secretary Stotz next presented and read the

REPORT OF THE BOARD OF DIRECTORS.

It was noted that during the year 11 well attended meetings of the Board had been held. The Board, listening to the recommendations of the preceding Board, had selected permanent headquarters (Engineers Building, N. Y. City), and had engaged a salaried Secretary, to devote his time to the affairs of the Association. During the year a monthly Bulletin had been printed and distributed to the members, the copies reaching an approximate total of 26,000. The work was done at a total cost of $1,200. It was proposed this coming year to increase the "Bulletin" to 20 pages, with an edition of 2,200 copies each month, the estimated expense being $1,500. The appointment of special committees having been set out, special reference was made to the excellent work which had been done in the instance of the forming and carrying on of local sections. It was suggested that as the Membership Committee and the Local Section Committee were so closely allied that it was thought better to amalgamate them. It was noted that the membership had well passed the 2,000 mark, which number, however, should not be considered anything like a finality. In fact to further stimulate an enlarging of the membership, State Chairmen had been appointed in each (and a Provincial Chairman, in Canada) to still further increase the membership. It had also been determined that it would be best for the Association to work along its original lines rather than amalgamate with any existing body of a kindred nature. The praiseworthy action of the Committee on Relations with Manufacturers had resulted in the formulating of a standard "Handbook of Gas Appliances," which would be of great use and effect quite an economy as well, in the matter of instructing canvassers on appliance account in their duties. The work of the Commercial Committee was mentioned, and it was suggested that it be recommended that it pay attention to subjects, that might properly come under the several headings suggested. Further that those subjects, as they were worked out, as to treatment should be published in a department of the "Bulletin." The good work of the Committee on Illumination was noted. The reports of the various sub-Editors and Standing Committees in general were gone over with credit to those engaged in the work. The assistance given the Association by the various JOURNALS was noted and acknowledged. The segregation of the offices of Secretary and Treasury was suggested. The Treasurer's report was in every sense satisfactory, showing as it did a receipt of $8,653.45, an expenditure of $7,993.26, and a balance sheet showing current assets amounting to $5,573.86.

On motion of Mr. C. A. Learned (seconded) the report was ordered received and filed, and the President called for the

REPORT OF THE COMMITTEE ON NEW MEMBERSHIP,

which was presented by Chairman P. S. P. Young. He reported that the new membership applications numbered approximately 1,100, and added the applications were still coming along with great frequency. On motion of Mr. Young the members whose applicatious had been passed upon by the Board of Directors were declared admitted to full membership.

Next came the

REPORT OF THE SECRETARY.

which told in detail the workings of that office for the twelvemonth. Naturally there was some duplication of the facts brought out in the preceding reports, but noteworthy in its lines were the passages, relating to the good work that had been accomplished in connection with the monthly "Bulletin."

On motion of Mr. R. C. James (seconded), the Secretary's report was placed on file, after which came the

REPORT OF THE TREASURER,

which was handed in by Mr. P. S. P. Young, of Newark, N. J. The main figures in this are given above.

Mr. A. V. Wainright, as Treasurer of the Finance Committee, submitted the report therefrom. It noted the certification of the accounts of the Treasurer, and suggested that votes of thanks were due in this connection to the Treasurer, Mr. P. S. P. Young, Mr. W. H. Pettes, Mr. R. C. James and Mr. Edward Porter, for valuable services rendered in systematizing the conduct of the financial affairs of the Association during the past year.

On motion, the report was accepted and placed on file. First Vice-President H. B. McLean took the chair and President Wrightington read the

PRESIDENT'S ANNUAL ADDRESS.

[For the text of the address, see JOURNAL, *ante*, p. 1136.]

On motion of Mr. Shattuck, the address was ordered referred to a special committee, with instructions to consider its recommendations and report its findings in respect thereto at a later time. The Vice-President appointed as such committee Messrs. A. V. Wainwright, J. D. Shattuck and Norman Macbeth.

The President resumed the chair and called for the

REPORT OF COMMITTEE ON NOMINATIONS,

which was read by Chairman Shattuck. The following named gentlemen were recommended for office bearers:

For President.—C. N. Stannard, Denver, Col.
For First Vice-President.—L. S. Bigelow, Buffalo, N. Y.

For Second Vice-President.—G. R. Chamberlain, Grand Rapids, Mich.

For Third Vice-President.—R. C. Frampton, Pittsburgh, Pa.

For Directors (2 years).—Ewald Haase, Milwaukee, Wis.; Geo. W. Thompson, Chester, Pa.; A. P. Ewing, Detroit, Mich.; L. F. Blyler, Minneapolis, Minn.; H. D. Frueauff, Pueblo, Col.

For Directors (1 year).—R. E. Sard, Albany, N. Y.; J. J. Knight, Kalamazoo, Mich.; W. J. Clark, Mount Vernon, N. Y.; C. W. Hare, Philadelphia, Pa.; R. M. Searle, Rochester, N. Y.

For Secretary,—Louis Stotz, New York City.

ELECTION OF OFFICERS.

On motion of Mr. James (seconded) the Secretary was instructed to cast the ballot of the Association in favor of the election to office of the gentlemen named, and he subsequently reported having acted in accordance with the instruction.

Amid prolonged applause, Mr. Hare (acting as a Committee of one in the premises) escorted President-elect Stannard to the platform. In an exceedingly clever speech Mr. Stannard acknowledged his obligations, asked for the co-operation of the members, and pledged his best effort to sustain and advance the objects and aims of the Association.

Mr. J. D. Shattuck (Chairman) here read the

REPORT OF COMMITTEE ON NEXT PLACE OF MEETING,

the Committee reporting unanimously in favor of Denver as the place, and the fourth week of October as the time for holding the Seventh Annual Convention.

On motion of Mr. McLean (seconded) the question of acceptance was placed before the convention by the President.

Mr. C. W. Hare said he heartily favored holding the next annual meeting in Denver, for he knew of no liver or more interesting city in this country. He thought, however, before the convention took action in respect to changing its meeting time, serious thought should be given the proposition. He had been told that amongst the reasons favoring changing the date of meeting from December to October were: Commencing November 1st the railroads increase their fares; hence it would cost more to reach Denver in December than in October. Secondly, December in Colorado was not as favorable to outdoor enjoyments as October would be. Third, the manufacturers say they are under constantly increasing expense through having travel ing representatives attend the conventions of the National Commercial body and of the American Gas Institute. The latter always held its meeting in October, and the former holds constantly increasing, successful meetings in December. The manufacturers claimed if these meetings are held within a week of each other their representatives can be moved at less expense, say from St. Louis to Denver, than if it were necessary to bring them back home only to send them later in the year to attend the December convention. He felt it was an important question. They did not wish to burden the manufacturer with unnecessary expense, but he personally felt the manufacturer should send his representatives to gatherings where they met the buyers of gas corporations. If the commercial man were the one who bought the product of the manufacturer, it was the voice of the former that controlled the type and quantity of appliance to be bought. He thought several factors showed why the Association should not change its meeting time. First, it was always difficult for the active men of a corporation to spare a week to attend any convention. The time spent should not be regarded as a holiday season, for the man taking such time was giving his entire time for his company, quite as if he were home in his office. He claimed it would be much more difficult for those men who desired to attend both conventions to spend a week in St. Louis and the next week in Denver, in that it meant taking the more active men of the corporations from larger interests for two consecutive weeks, which was too much time for any man interested in the development of his home work to spend away from it. Another underlying thought was, were they not, if the motion were accepted, not making a step towards ultimate amalgamation with the Gas Institute? Their President ably expressed sentiments which the speaker believed were those of the majority of the Commercial Association in opposition to such amalgamation He personally felt if they took the step proposed they would deliberately put themselves in position where the Institute could say: "They are coming our way." That was not so. The Commercial was standing on its own feet. He should vote against the motion on that account alone.

Mr. P. S. Young thought Mr. Hare presented the case in very able manner. The six succeeding conventions, held at this time of the year, witnessed a constantly growing attendance, and he thought the current attendance was a record one. He believed they had selected the right time of year, and that the Committee had recommended a good place. He heartily favored Denver, for he believed in its people; further, the Colorado men who worked so ably in adding to their membership were entitled to have the convention. They needed representation in the West, since they had not over 3 members there where they should have 300. Apart from the place, he could see no reason whatever for changing the date, whereas he could see many reasons to the contrary. October came too soon after vacation period, and is a month when they have got to exert every effort to get and to hold the lighting business. In that regard they certainly could spare them for two weeks, and he believed it would take three weeks to get to St. Louis and Denver and return. The Institute and the Illuminating Engineering Society held their meetings that month. Another question was that of weather. He understood the weather is fine there all the year round, and he believed they could have a good time and a good meeting in December.

Mr. Rogers moved as an amendment that the date be changed from October to December. [Seconded by Mr. Hare.]

Mr. Clabaugh desired to reiterate Mr. Hare's remarks in the matter of amalgamation. Their Association had now grown to such magnitude that it could be the leader and not the follower of all American Associations, and followers they evidently would be if they approached the amalgamation period with the Institute. The latter had a duty to perform, as to which all thoroughly agreed and heartily support the work it did. But their Association had a far greater duty and a greater work to perform, wherefore their Association is of a much greater magnitude. The country certainly was large enough to support two associations, one technical the other commercial. He named the technical first, because that had been the first in the eyes of the men of the gas industry of this country; but to-day he would change it to commercial and technical. The latter men must necessarily follow the leadership of commercials, for it made no difference how they exhausted their resources in the reduction of the price of the article made, unless it were put on the market and sold by the commercial men it would be of no interest whatever, wherefore the companies would necessarily go to the wall. That, though, was another matter. As far as Denver was concerned, it is in the Garden of the Gods, where sunshine always is. And he could even imagine that were the sun obscured by clouds the light of the Denver Gas and Electric Company would equal any daylight ever seen East.

Mr. Offutt remarked he didn't know that they really should decide so quickly about going to Denver, although he was very strongly for that city. He differed with Mr. Hare over his remarks as to commercial men being always responsible for the purchase of supplies from manufacturers. It might be true of the larger companies, but in the smaller ones a like state of affairs was not always the case.

Mr. Shattuck said that the committee in considering the question took up the three reasons Mr. Hare so cleverly outlined. There were several reasons why it was thought not advisable to go to Denver in December. As President-elect Stannard was present, perhaps it might be well to hear what he had to say on the subject. As to amalgamation fear, he didn't believe that that existed. As an engineer he belonged to the American Gas Institute, and had been on its Directorate all the time he was active in the commercial field. Not for a minute had he thought the time was ripe for amalgamation. He always favored, if there ever was such an amalgamation, a broad organization embracing the two Associations. He didn't think that day had arrived, and he believed you would find the majority of the leaders of the American Gas Institute to-day feel that amalgamation is not desirable.

Mr. Clark remarked that, having heard from those connected with the gas industry, he thought the manufacturers, being so large a factor in their large Association, should express an opinion on the subject. He thought they should speak as to their preference for a date.

Mr. Clark (Chicago) thought the Committee's report as to the time was not satisfactory. He always felt it was not a fair proposition to put on the incoming officers of the Association the time and place of meeting. He would amend the report to the effect that the meeting time be left with the incoming Board of Directors to decide. [Seconded.]

Mr. Frueauff said if the city of Denver were decided upon as the place of the meeting, and speaking for the officers of the Denver Company, they would be glad to have the Association at either time, and

would feel honored in any event. His personal view was only from the standpoint of the nature of the entertainment that would be prepared. In October it was still possible to have some sort of outdoor entertainment, whereas it likely would be all indoors in December. As for railroad rates, no one could say until the matter was up with the Railroad Association. His impression though was they would not get special rates unless the convention was held prior to Oct. 31.

The President asked Mr. Stannard for an expression of opinion.

Mr. Stannard said he inclined to the view expressed by Mr. Frueauff. As to railroad rates, owing to adverse legislation in some of the Western States against railroad companies it was almost impossible to secure a reduced rate; in fact, he assured them it would be utterly impossible to secure a reduced rate. The October rate between Chicago and Denver is $30, the round trip, whereas in November or December it was $45.20. Supposing the 1,000 or more gentlemen here should attend that convention. It looked that a $15,000 saving to the members of the Association in taking that trip from Chicago to Denver was worth while, and he was not considering a like saving this side of Chicago, for he understand it was also true that from such Eastern points as New York and Boston, a similar reduced rate was in effect, which rate expired October 31st. On these points he spoke authoritatively, having looked into it carefully. Another important item was the fact that it would be perhaps impossible for them to secure the Auditorium in December, although it could be easily secured in October, the reason being that the city rents the Auditorium to travelling companies during the theatrical season, usually to the Shuberts, with whom they all were familiar. He mentioned two most important reasons, businesslike reasons, reasons which would actuate them in their everyday business. He asked, when this was put to a vote, to kill the amendments. Then vote for the convention to be held in Denver, in October, for the most important reasons which he had mentioned. He could mention additional reasons. He agreed with Mr. Clabaugh in his comment respecting Denver, nevertheless they had different degrees of beautiful weather. In October the weather is certainly much more delightful than in December. We have many outdoor trips and sports in which you may share during a visit to Denver in October, which we may not be able to pull off in December. For his life he could not see how a change of date to hold the meeting a couple of months earlier had any connection with consolidation with the Institute. He did not believe the vast majority of men present can trace any connection in such line of happening. As to length of time required for attending the convention, all Western men when East attending the convention took much time to travel back-and-forth as would be taken up travelling to St. Louis then to Denver, spending a week in each place. He thought with the convention at St. Louis and the convention at Denver and the trip to the two cities it would be well worth while to spend a couple of weeks, if necessary, to make the two points. He was inclined to think the commercial men could better be spared from their fields of work in October, and he spoke from years of experience as a commercial manager when he said he would prefer to have their commercial men leave during October than have them leave in December, when the peak load was approaching. That applied more, perhaps, to those of the engineering division. In fact they left in Denver some men who would like to be here, but who could not so be on account of the near approach of the holidays and the importance of their being there "on the job." He thought it would be much more convenient for the majority to get away in October than in December. In concluding the speaker said: I feel, gentlemen, that, as a matter of business principle, the immense saving which can be made and that factor of the uncertainty of getting the convention hall in December should actuate you in the vote which you will presently take. We certainly want you to come to Denver. The Denver crowd will be glad to welcome you whether you come in January, December, July, May or October. I believe I express the opinion of many in the room that it shonld be perhaps held in October, but we will welcome you at any time.

A member moved the previous question (seconded), when Mr. Hare arose to say, before the previous question was acted upon, he would like to speak for a moment on the matter raised by Mr. Stannard as to whether or not it were more convenient for the average gas company to allow its really active commercial men to leave their jobs in October or in December. The salesmen in the employ of the various companies operated by the United Gas Improvement Company could leave their jobs to very much greater advantage in December than in October. They started their active lighting campaign toward the middle of September and were going full swing about the middle of October, whence it would be much more convenient, as far as their particular corporation was concerned, to have its salesmen away in December than in October.

The Chair ruled Mr. Clark's amendment out of order, on account of the constitution, which provided that at this meeting the Association shall select the time and place. Such time and place might be altered by the new Board of Directors in case of emergency, but this meeting must name a time and place. The amendment to the original motion, to the effect that the report of the Committee be accepted with respect to the place of next meeting, but that the time be changed to a week in December corresponding to this week, was now before the house.

[On a *viva voce* vote the amendment was declared rejected.]

After considerable desultory debating the President finally put the motion, to adopt the original report of the Committee on place and time. [The report was declared not concurred in.]

The President here said he was instructed by the Mentors in the front row that the Association had not determined the date or place of next meeting, which he thought was correct. A motion was accordingly in order to settle the matter.

The debate was renewed, and, after many motions and countermotions, the motion, by Mr. Rogers (seconded), that the next meeting be held in Denver, Col., the first Tuesday in December, was adopted. A recess until 2:30 was ordered.

First Day—Afternoon Session.

The convention reassembled at 2:55 P.M., and the Secretary was instructed (moved by Mr. Clark, of Mt. Vernon, seconded by Mr. McLean, of New York) to send a telegram to Mr. W. H. Allen, regretting his inability to be present on account of illness.

The Secretary read this

Telegram from Oakland, Cal.

December 5th, 1910.

National Commercial Gas Association, in Convention assembled, Boston, Mass.: Greetings—The Pacific Coast Gas Association, and all California, invites and urges you to accept our invitation to meet in San Francisco during Panama Pacific Exposition 1915. American Gas Institute, Canadian, Southwestern, Southern and Northwestern Associations, will be invited to hold sessions and make this the greatest congress of gas men ever convened. Best wishes for the success of your meeting.

F. A. Leach, Jr., President.
J. A. Britton, Secretary.

Death of Mr. Bert L. Williams.

Mr. J. J. Garrison made the following announcement: Word has just been received from Detroit announcing the death of Mr. Bert L. Williams. Mr. Williams was very well known in the Central Western States in the gas fraternity. It seems his death was quite sudden. While Mr. Williams was a young man, I think he has been identified with the gas industry for something like 10 or 12 years and always has been very active in this work. I thought it would only be fitting and proper that this meeting should send a telegram of sympathy to Mrs. Williams and the immediate relatives at Detroit, where Mr. Williams has just passed away. I move, Mr. President, that the Secretary be instructed to send a telegram to Mrs. Williams, at Detroit, expressing the sympathy of this Association. [Adopted.]

The President instructed the Secretary to send an appropriate telegram, and then detailed some changes in the programme, made necessary by the weather conditions.

Mr. H. B. McLean here offered the following

Preamble and Resolutions,

respecting certain advertisements that appeared in certain papers and publications which had to come to the notice of the Directors:

Whereas, It has come to the attention of the Board of Directors that certain advertisements, condemning the use of gas ranges with pilot lights, and describing such ranges as dangerous and unsafe, and suggested liability for damages to any dealer who sells such a range; and,

Whereas, These certain advertisements have had a wide distribution, not only by circulars, but also in monthly magazines and Sunday editions of at least 10 of the leading papers throughout the country; therefore, be it

Resolved, That it is the sense of this Association, in convention assembled, that such condemnation of gas ranges, and such advertisements as above referred to, are misstatements, unwarranted and

without foundation, and are detrimental to the use of gas ranges so constructed; and be it further

Resolved, That this Association condemns without prejudice any and all such misstatements of fact as harmful, and not in accord with the objects of this Association; and be it further

Resolved, That this resolution be spread upon the minutes and also published in the monthly Bulletin of the Association.

This resolution has been approved by the Board of Directors and is now offered for action by the Association.

On motion (seconded) the preamble and resolutions were adopted unanimously and without debate.

(To be Continued.)

Special English Correspondence.

COMMUNICATED BY NORTON H. HUMPHRYS.

SALISBURY, ENGLAND, December 7, 1910.

Recent Progress and Present Status of Gas Lighting.—A New Effusion Test.—Gas and Hygiene.

A feature of last month was a paper read by Mr. F.W. Goodenough, controller of sales for the Gas Light and Coke Company, on recent progress in and the present status of gas lighting, at a meeting of the Illuminating Engineering Society. The interest and importance attaching to the paper were not lessened by the fact that the discussion on the same was opened by Mr. C. Carpenter, Chairman of the South Metropolitan Gas Company, who was followed by Mr. W. H. Y. Webber, Dr. Lessing, Mr. W. J. A. Butterfield, Mr. A. E. Broadberry, Mr. R. W. Edwards and other authorities on this particular subject. The author was somewhat hampered and limited by being on neutral ground, and therefore compelled to avoid anything in the way of a commercial controversy, as to the costs or advantages of gas as compared with other illuminants, or advertising of particular appliances, and if this was a cause of disappointment to those who like a fight of any kind, irrespective of the merits, it did not detract from the general interest and value of the communication. It is not too much to say that there is no one in England in a better position for writing such a paper, and the author has drawn freely upon the materials furnished by his experiences, with the result that the technical reader will find plain and no uncertain opinions in regard to many debatable questions of the day, such as the feasibility of central or suspended lighting, the proper lines on which to run a system of burner maintenance, inverted versus upright burners, etc. The limitations observed by the reader were strictly adhered to by the speakers in the discussion, and the attempt to run the play of Hamlet without the leading character was a decided success. One conclusion that may be drawn is that a controversial paper has its limitations, as well as one of the opposite kind, and that in the heat of controversy cardinal facts are apt to be obscured or overlooked. The paper and discussion did not suffer, from a general informative point of view, and one cannot rise from a perusal of the report on the same without feeling a wish that contributions on such lines were more frequent.

The interest attached to the subject was greatly enhanced by excellent photographs, and in this connection one may remark on the important improvements that have been made in the way of obtaining impressions of gas lighted streets or thoroughfares. I do not know whether the improvement is to be credited to the gas or to the photographer. But these, as well as several others that have recently appeared in our technical literature, present all the accuracy of detail that one expects in a daylight photograph and an entire absence of haze or blur in the vicinity of the lamps. I have seen some pictures of gas-lighted streets that reminded one of the well-known parody of the destruction of the hosts of the Egyptians. This consists of a plain panel painted red, and the visitor is told that the Israelites are gone over and the Egyptians are all drowned. But this defect is now remedied.

Mr. Goodenough directs attention to the interesting fact that inversion of the burner has been the means of obtaining an increased duty, not only with the incandescent, but also with the flat flame burner. The inverted regenerative burners of the Siemens or Wenham type increased the duty threefold, from about 3-candle power per cubic foot to 9, and the inverted incandescent burner also shows a large increase of duty. It also possesses many special advantages, such as lending itself to the use of shadowless lamps, a wider range, say from 25 up to 4,000-candle power on one lamp, and the shape of the mantle insures greater strength and durability. He also has something to say about automatic appliances for lighting and extinguishing. He was very emphatic on the necessity for maintenance of incandescent burners being entirely in the control of the gas company, and that they should be the sole judges of the proper time for renewals. As to the life of mantles, a fair average in public lamps is 500 to 600 lighting hours, and in private lighting the life will vary a great deal according to the surroundings.

The discussion on the paper had the effect of bringing out a reply equal in value to the original, and proved that the author was well able to give the reasons for the faith that is in him. He pointed out at some length the practical objections to centrally suspended lighting, one of the chief of which was that the lanterns must necessarily be set at such an elevation as to be useless in foggy weather. Speaking of supply pressures, he instanced the average in London as 30-tenths. Dealing with the various methods of charging for maintenance on consumers' premises, he strongly recommended an inclusive charge per burner per quarter, as giving the gas company full control.

At the conclusion of the discussion it was stated that a series of questions had been prepared and issued to various authorities in this and other countries. They included the maximum duty obtainable at the present time and the most accurate way of expressing it, the average life of mantles both for ordinary and high pressure, and results of the falling in duty after prolonged use, the practicability of automatic control of lamps, how far it is desirable for the control of burning accessories in the matter of maintenance to be carried, and the desirability or otherwise of obscured globes for high power lights. Some of the replies received appear in the current number of the *Illuminating Engineer*. Mons. P. Lauriol, the chief engineer of the lighting department of the city of Paris, considers that for street lighting comparisons should be on the basis of the mean lower hemispherical intensity. Some tests with upright burners at ordinary pressures (20-tenths) gave a duty of 22 to 30-candle hours per cubic foot of gas, and these were not the maximum values, but the average over 400 hours' working. Inverted burners at ordinary pressure gave slightly lower results, but at 550-tenths pressure they gave 43-candle hours. Mr. Geo. Keith, of London, said that the results must necessarily vary with the quality of gas used, but he could obtain an average of 60-candle hours from ordinary, or 73 from extra good gas, and from oil gas he had obtained as much as 120. He agreed with M. Lauriol as to the proper basis for comparison. In this respect he was also supported by Prof. Strache, of Vienna, who had obtained as much as 37 candles from gas at ordinary (20-tenths) pressure. He was strongly in favor of gas companies undertaking maintenance of incandescent burners. Hon. M. Scholz, of Berlin, had obtained a maximum of 64 candles with high pressure and 43 with ordinary pressure gas. A lamp giving 39 candles was largely used in the street lighting of Berlin. The average life of mantles at ordinary pressures was 500 lighting hours. All the writers agreed that obscured or diffusing globes were not necessary with high power gas lighting.

Messrs. Alexander Wright & Company, of Westminister, have just put on the market a handy portable form of Bunsen's effusion test, which is based on the law that the escape of gases through a small aperture is proportioned to the square root of the specific gravity. It consists of a small gasholder, a minute stop clock, a counterbalanced lever pointer, and a scale having a high and low mark. The gasholder having been filled with air to a point well above the high mark, the pointer slowly descends as the air escapes through the orifice. When it passes the high mark the clock is started, and stopped when the low mark is reached. It is easy to obtain correct results within half a second. The time for air being noted, the holder is charged with the gas to be tested and the time taken in a similar manner. The gas is then caused to pass through a bulb tube charged with potash solution to absorb carbonic acid and a third test taken. The respective times are squared, and the result for air divided into that for gas gives the specific gravity. The following are the figures from an actual test:

Air, 57 seconds.....	.....		
Gas, 38.5 "	.....	$(38\frac{1}{2})^2 \div (57)^2$	$= 0.456.$
" 37.0 "	.....	$(37)^2 \div (57)^2$	$= 0.421.$

The gas, therefore, contained sufficient carbonic acid to raise the specific gravity from 0.421 to 0.456. The object of the carbonic acid test is to define whether a high specific gravity is due (a) to carbonic

acid, or (b) to nitrogen due to air being drawn in at the retorts. As a rapid test in the course of regular operations the apparatus is entitled to rank with the jet photometer as a means of indicating any variation from the normal composition, and indeed the results approximate more closely to careful weighing in a proper flask than the jet does to the Bunsen photometer. Every detail of the construction has been carefully worked out to enable accurate results to be easily obtained, and the instrument, being nickel plated, presents quite an attractive and ornamental appearance for the office or library.

A great deal of labor has been expended, by persons interested in non-combustion lighting, towards creating a feeling of panic respecting the products of combustion from coal gas when used in an ordinary apartment. And to give the thing a show of authority, experiments have been made under abnormal conditions in small and almost hermetically sealed apartments. Proper ventilation is as necessary in rooms that are only used during the hours of daylight as in those that are occupied by workers or pleasure seekers after dark. And the line of policy above indicated is likely to have a mischievous effect, by giving rise to an impression that all required to secure healthful ventilation is to give up using gas. It is well known that the products of combustion from coal gas are carbonic acid and water, and although a great point is made of oxygen destruction, the percentage of oxygen present, as shown by analysis, is not affected. New experiments made under ordinary conditions and by impartial observers have always brought out the fact that any light which also gives out heat improves the condition of the air, and that the atmosphere of a room, sufficiently well ventilated to meet the requirement during daylight, is improved rather than otherwise by lighting up a few gas burners. The heat given off by them encourages circulation of air and increases the ventilation. It is admitted by sanitary engineers and hygienic authorities that one of the most reliable tests of the purity of the atmosphere is the percentage of carbonic acid.

Mr. G. Stanley Cooper has recently communicated to the *Journal of Gas Lighting* the results of some experiments conducted in an ordinary apartment, 14 feet by 12 feet by 12 feet high, with one door and two windows, (a) when lighted by a tantalum lamp; (b) lighted by an incandescent gas burner of approximately similar candle value, of 3 hours. The increase in carbonic acid was 0.154 in the first case and 0.132 in the second, showing that the natural increase in carbonic acid, due to the occupation of the apartment, was not accelerated by the burning gas, but, on the other hand, was reduced to an appreciable extent. In this respect Mr. Cooper's results are in agreement with observations made by Prof. Lewes, Dr. Rideal and other authorities. The results obtained with an incandescent burner must not be confounded with those from the flat flame, which possibly might not be so satisfactory, but which are of no consequence, seeing that there is no reason why the flat flame should be preferred. And it should always be remembered that by the use of very simple and easily applied devices the gas flame can be made the medium for securing an even proportion of carbonic acid. Starting with the normal proportion of 0.6 or 0.7 per cent., it need not at any time rise to exceed 1 per cent.

Recent Patent Issues.

Prepared for the AMERICAN GAS LIGHT JOURNAL by ROYAL E. BURNHAM, solicitor of patents and counselor in patent causes, 833 Bond Building, Washington, D. C., from whom illustrations and specifications of any patent mentioned below may be obtained for 10 cents.

978,133. Inverted Mantle Lamp. F. M. Brooks, New York City.

978,207. Gas Burner Attachment. M. G. Ray, Richmond, Va., assignor of one-half to C. K. Bryant, same place.

978,268. Appliance for Controlling the Making of Water Gas. H. N. Cheney, Boston, Mass.

978,338. Gas Stove. O. H. Schraeger, Milwaukee, Wis.

978,354. Gas Producing Oven. H. A. R. Broker, Hamburg, Germany, assignor to Ofenbau-Gesellschaft M. B. H., Munchen, Germany.

978,384. Meter Box. H. M. Lofton, Chattanooga, Tenn.

978,402. Attachment for Gas Stoves and the Like. J. Schofield, Paterson, N. J.

978,477. Incandescent Gas Lamp. A. C. Noad, London, England, assignor of one-third to T. T. Russell, Liverpool, England.

978,532. Canopy for Gas and Electric Light Fixtures. L. Andersen, Waterbury, Conn., assignor to the Plume and Atwood Manufacturing Company, same place.

978,556. Fixture. P. Burger, New York City.

Items of Interest
FROM VARIOUS LOCALITIES.

THE transfer books of the Cincinnati Gas and Electric Company were closed this time (mid-December) to permit of the payment of the first dividend on the basis of 5 per cent. per annum. When the lease of the Company's properties was made (July 1, 1906), 4 per cent. per annum was guaranteed for 2 years; 4½ per cent. for the next 2 years, and 5 per cent. thereafter during the continuance of the lease, which is to run for 99 years.

MR. WILLIAM DARBEE has resigned as Assistant General Manager of the Baltimore Consolidated Gas, Electric Light and Power Company, the same to become effective the first prox. Mr. Darbee, who first took service with the Company when Mr. Alten S. Miller assumed the direction thereof about 8 years ago, had chiefly to do with the electric service of the Company, has accepted the position of electric expert, to direct the electric plant of the Brooklyn *Daily Times*, an occupation which one could readily believe will not necessarily occupy Mr. Darbee's entire attention. The Baltimore *Sun*, in announcing the resignation, said: "It was explained that, in perfecting the reorganization of the Company, and the introduction of its product (both gas and electric) to the consumer, many solicitors and experts were employed. It is thought that this organization is now about complete, and that the services of much of this force can be dispensed with."

MR. PHILMER EVES, Sales' Agent for the Indianapolis (Ind.) Gas Company, informs us that the proposed meeting of the International Association of Stewards, which was to have been held in Indianapolis last Thursday, has been postponed to some day in the last week of January.

THE Westinghouse Department of Publicity announces that the Westinghouse Diary of 1911 is "out." Likely Manager McQuiston meant that it was out-of-sight, for those who have received copies thereof, keep it tucked away in the top pocket of the vest, in which it may be out-of-sight but never out of mind. It is truly and accurately a gem in this line of publication work. Manager McQuiston's address is with the Pittsburgh (Pa.) home office of the Company. His initials are "J. C."

ACCORDING to the statement respecting the operation of the municipal gas plant at Hamilton, O., for the month of October, Auditor Graines shows that the expenditures were $4,733.95; receipts, $2,577.08; or a deficit of $2,156.87.

THE St. Louis County Gas Company, of St. Louis, Mo., has taken out a permit for the construction of the necessary buildings in connection with the housing of the water gas apparatus, the installation of which it was agreed upon last October, in the Webster Groves-Clayton section of its territory.

MR. J. A. HASLETTE, owing to ill health, has resigned the position of Commercial Manager of the Altoona (Pa.) Gas Company.

"B. G. M.," writing under date of the 17th inst., from St. Louis, Mo., says that, "Gas for fuel and illumination was provided for, in the ordinance passed last week by the City Council of Ferguson, Mo., granting a 20-year franchise to the West St. Louis Gas Company. A special election, at which the citizens will vote on the ordinance granting the franchise, will be held January 14th. The ordinance provides that the Company shall have the work of installing mains complete within 3 years, and that a 10 per cent. discount shall be allowed on all bills paid within a certain period after their rendering—15 days, I believe is the provision. The price of gas on both accounts rules at $1.30 per 1,000, gross. It is also specified that, should the projects to bring natural gas to St. Louis materialize, the Company binds itself to supply the natural product for 60 cents on lighting and 50 cents on fuel acount."

THE Detroit City (Mich.) Gas Company has purchased a large plot of ground on Fort street, west, near 24th street, and on Fort street, south and west, between 24th and the boulevard, and back to Jefferson avenue, west. The surface thus secured affords a noble site for a gas plant, such as within comparatively short time the Detroit Company will have to construct, so great is the increase in popula-

tion and manufacturing activities of the city. The correspondent who forwards this mention, adds: "This plot is notable for holding the Labadie homestead, on Fort street, west, and 24th street, one of the historic landmarks of the city. The log cabin now clapboarded, was built about 150 years ago, from logs that were floated down from St. Clair. One of the gables still bears the marks of shot which are said to have been fired from one of Commodore Perry's ships in 1812. John Newell, a former auditor of the Michigan Railroad, owned and lived in the house for many years, and until a quarter century ago it was still occupied by members of his household. Mrs. Mary Bush, 296 Warren avenue, one of the legatees of the Newell estate, is endeavoring to interest Detroit city officials in a plan to have the log cabin removed and preserved in some public park as a reminder of Detroit's pioneer days."

THE Springfield (Mass.) Gas Light Company has submitted a proposition to the authorities of that go ahead city under which it willingness is expressed to give a demonstration of illumination by means of cluster gas arcs, the illumination to be made in some public place that will be agreeable to the authorities. It is presumed that some street or avenue or square will be selected that is not particularly well lighted, and in such district to properly show by actual comparison the advantages and positive superiority of the new way over the old.

ON the 1st prox. the rate for gas on all accounts and uses in Bakersfield, Cal., will be reduced to $1 per 1,000 cubic feet. This is intended in some sense to offset the advent of natural gas in that city, which it was thought would be turned into the mains early in January. It might be added that the figure above given will be the maximum rate to the users of the smallest quantities. To users of larger quantities a sliding scale of discounts is being arranged, the minimum figure on maximum use being about 60 cents.

AT a recent meeting of the Board of Directors of the Consolidated Gas, Electric Light and Power Company, the resignation of ex-Mayor F. C. Latrobe was accepted, and Mr. J. E. Aldred, President of the Pennsylvania Water and Power Company, was elected his successor. The Mayor, however, will not altogether sever his connection with the Company, since he will remain on its Board of Directors, and will also act in the capacity of Special Counsel to the Company. The resignation caused general surprise, for Mr. Latrobe had not even spoken on the subject to his intimates. Mr. Chas. M. Cohn, who has been General Manager of the Company, was elected Vice-President, and to him has been delegated entire charge of its gas division. Further reorganization of its executives was the election of Mr. Herbert A. Wagner, as Second Vice-President, charged with managing the electric division. Mr. William Schmidt, Jr., was elected Secretary. The finance section was continued in charge of Mr. John L. Bailey, now the Company's Treasurer. The new President of the Company is not by any means new in Baltimore's high financial circles. The Baltimore *Star*, in commenting on the changes, for instance, having to say this about him: "Since he became financially interested in the Consolidated Gas, Electric Light and Power Company, he has won many warm admirers because of his keen business sense, and the push and energy displayed by him where big things are concerned. Over 2 years ago Mr. Aldred was attracted to Baltimore because of the advantages which he thought it possessed, and he and his friends acquired a large interest in the Gas Company. Last October he was elected a member of the Company's Board of Directors, to succeed Mr. S. Davies Warfield, President of the Continental Trust Company, declining re-election because of press of business. Mr. Aldred, since his connection with the Company, has managed to imbue it with some of his own spirit, for a week or so after he was elected Chairman of the Board he conceived the idea of building a 'bee-hive' for Baltimore, in which manufacturing plants could be located, to which plants the Company furnished power. He is President of the Pennsylvania Water and Power Company, which has a contract with the Gas Company to furnish Baltimore with power from the Susquehanna river. The Pennsylvania Company has built a massive plant at McCall's Ferry at a cost of about $13,000,000, and the dam which it has constructed across the Susquehanna river is said to be the largest in the world, with one exception. Mr. Aldred has associated with him a number of Canadian and English capitalists, and has unlimited capital at his command."

THIS marks virtually the closing from activity of the capitalists who began their control of Baltimore's gas supply in or about the year 1887. It never was in better condition financially than it is today, and while Mr. Aldred and his associates are to be given great credit for the success which attended their efforts over the Company's reorganization, nevertheless we believe it should not be overlooked that Gen. Latrobe, Secretary Cohn and former Director Dickey, are to be credited with a rousing good measure of credit for their long sustained efforts in line of keeping the Company a reputable going concern during the late 90's.

IT is seldom, that a man, on retiring from office, no matter how great that office was in its responsibilities, is sent along over his new business journey with the varied greetings of his "Master and his men," with such an abundant outpouring of recognition and good wishes as those bestowed upon Mr. Ralph S. Gavitt, on his relinquishment of the duties of Superintendent of the Leominster (Mass.) Gas and Electric Light Companies. Three of these recognitions we have heretofore reported, but now we have knowledge of a fourth, which is in the shape of the following letter from Mr. Alfred Clarke, President of the Massachusetts Lighting Companies, which corporation is the operator of the plants heretofore superintended by Mr. Gavitt: "I am sending you by this mail * * *, as an evidence of the high esteem in which I hold you. I want at this time to wish you all success that can come to you in your new venture. I am sure you are doing a very wise thing, and trust it will be for your best interests. The new life and people with whom you will mingle will broaden you and be an education. If, however, the country and the people with whom you are going to associate are not congenial, and should you in the future wish to return to the East, I shall be very pleased, indeed, to offer you a position, if I have one at my disposal * * *."

MR. P. R. WEST, writing from Boston, under date of the 14th inst., incloses the following: "A record breaking attendance marked the closing night of the annual exhibition of the National Commercial Gas Association, in Mechanics Building. Not in the history of gas shows has there been a more successful one. Larger membership, greater number of exhibits, record breaking attendance, unequalled interest, both by the public and by the gas men, have made both the meetings of the National Commercial Gas Association surpass in every respect all prior greetings of a kindred sort."

A NEW storage holder, for the Public Service Gas Company of New Jersey, Essex division, will be erected on a plot, corner of Howell street and Charlotte avenue, by the Bartlett Hayward Company, of Baltimore.

PAGE 26, edition of Sunday, the 11th inst., of the San Diego (Cal.) *Union*, was completely taken up by a reading advertisement, printed in bold type, which had for its heading "Why Gas Companies Urge Gas Economy." The text of the story was conventional, and told the tale that it set out to tell, in commonplace way, perhaps, but in convincing way certainly, of the anxiety of the Company to see to it that its customers were getting full value in that which was supplied them. Special stress was laid upon the convenience and utility to the consumer of the services of the Company's Emergency Force, and that avail of its aid is frequently made the Company proves by submitting a list of 71 calls made upon it during the last week in November, 10 of which were connected with meter troubles. The "ad." certainly must have attracted the attention of everyone who purchased the noted edition of the paper named."

FOR the days of Nov. 16, 17 and 18, Gas Inspector A. S. Meeds reported to the Council that the gas supplied by the Minneapolis (Minn.) Gas Company was under standard candle (18) power. As these reported inspections were on consecutive days, the Company, under its franchise regulations, became subject to a fine as provided in the governing regulations, of $100 per day. This if insisted upon would no doubt lead to a suit, for the Company's photometric daily test showed an average illuminating value for the days in dispute of 18.28, 18.19 and 18.11 candles. Having been shown these figures, Inspector Meeds had his attention called to some appearing oddities in connection with other positive calculations in his estimates, and he later admitted that his pentane supplies were sufficiently off schedule at the time in question to explain the discrepancies between his tests and those of the Company.

AT the annual meeting of the National Gas and Gasoline Engine Trades Association, which was held in Racine the second week of this month, Mr. C. O. Hamilton, of Elyria, O., was elected President, Mr. Adolph Stillwater, of course, was re-elected Secretary.

MR. FRANK CARLOW will take charge of the manufacturing division of the Port Jervis (N. Y.) Light and Power Company the first prox. He has been connected with the Company in a subordinate capacity for some time.

ON the night of the 13th inst. Dr. John B. Whitehead, Professor of Applied Electricity, Johns Hopkins University, Baltimore, delivered an interesting lecture (it was the second of a series of 10 that are arranged for on "Magnetism" before the employees of the Baltimore Consolidated Gas, Electric Light and Power Company. This course (it is altogether on electricity) is attracting great attention from the Company's workmen.

THE AMERICAN GAS LIGHT JOURNAL

A. M. CALLENDER & CO.,
PROPRIETORS.

THOS. J. CUNNINGHAM,
ELBERT P. CALLENDER,
EDITORS.

CHARLES H. WADELTON,
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AGENTS:

New York—American News Company, 39 and 41 Chambers street.
Germany—Lemcke & Buechner, of New York.
England—Aug. Siegle, 30 Lime street, London.

MONDAY, DECEMBER 26, 1910.

The Market for Gas Securities.

The gas share market was noted for dullness and firmness the past week. The changes were unimportant. Consolidated opened today (Friday) at 133¼ to 134. The event of the week, however, was the increase in the dividend rate by the Mutual Company, which is now on an 8 per cent. basis.

Brooklyn Union is 131 to 136, but, think it as one may, the Company's adherence to the prior rate of return, as shown in the last rate of dividend declarations, will not keep holders from believing that some important changes in the future dividend policy of the Company are not far off. Peoples of Chicago is 105½ to 105¾, and Laclede common is 105 to 105½.

Gas Stocks.

Quotations by George W. Close, Broker and Dealer in Gas Stocks.

115 BROADWAY, NEW YORK CITY.

DECEMBER 26.

☞ All communications will receive particular attention.

☞ The following quotations are based on the par value of $100 per share:

N. Y. City Companies.	*Capital.*	*Par.*	*Bid.*	*Asked*
Consolidated Gas Co.	$78,177,000	100	133¾	134
Central Union Gas Co.—				
1st 5's, due 1972, J. & J.	8,000,000	1,000	98	101
Equitable Gas Light Co.—				
Con. 5's, due 1932, M. & S.	1,000,000	1,000	—	105
Mutual Gas Co.	3,500,000	100	155	165
New Amsterdam Gas Co.—				
1st Con. 5's, due 1948, J. & J.	11,000,000	1,000	100	101¼
New York & Richmond Gas				
Co. (Staten Island)	1,500,000	100	35	50
1st Mtg. Gold Bds. 5 p. ct.	1,000,000	—	98¼	100¼
New York and East River—				
1st 5's, due 1944, J. & J.	3,500,000	1,000	104	107
Con. 5's, due 1945, J. & J.	1,500,000	—	97	101
Northern Union—				
1st 5's, due 1927, J. & J.	1,250,000	1,000	94	100
Standard	5,000,000	100	—	75
Preferred	5,000,000	100	70	100
1st Mtg. 5's, due 1930, M. & N.	1,500,000	1,000	100	105
The Brooklyn Union	15,000,000	1,000	131	136
1st Con. 5's, due 1948, M. & N.	15,000,000	—	106¾	107
Yonkers	299,650	509	180	—
Out-of-Town Companies.				
Bay State	50,000,000	50	⅝	¾
" Income Bonds	2,000,000	1,000	—	75
Binghampton Gas Works	450,000	100	—	65
" 1st Mtg. 5's	509,000	1,000	90	96
Boston United Gas Co.—				
1st Series S. F. Trust	7,000,000	1,000	82	85
2d " " "	3,000,000	1,000	47½	50
Buffalo City Gas Co.	5,500,000	100	5	8
Bonds, 5's	5,250,000	1,000	73	73½
Capital, Sacramento	500,000	50	—	35
Bonds (6's)	150,000	1,000	—	—
Chicago Gas Co. Guaranteed				
Gold Bonds	7,660,000	1,000	104	105¼
Cincinnati Gas and Electric				
Co.	29,500,000	100	92	93
Columbus (O.) Gas Co., 1st				
Mortgage Bonds	1,500,000	1,000	96	98
Columbus (O.) Gas Lt. &				
Heating Co.	1,662,750	100	90½	91
Preferred	3,026,500	100	75½	80
Consumers, Toronto	2,000,000	50	200	204
Consolidated, Baltimore	11,000,000	100	106½	—
Mortgages, 6's	3,600,000	—	89	100
Chesapeake, 1st 6's	1,000,000	—	—	—
Equitable, 1st 6's	910,000	—	—	—
Consolidated, 1st 5's	1,490,000	—	—	112
Consolidated Gas Co. of N. J.	1,000,000	100	15	17
Con. Mtg. 5's	880,000	1,000	92	95
Bonds	75,000	—	—	100
Denver Gas and Electric	3,500,000	—	102	105
Detroit City Gas Co	5,000,000	50	—	50
" Prior Lien 5's	4,619,000	1,000	97	100½
Detroit Gas Co., 5's	381,000	1,000	75	80
Equitable Gas & Fuel Co.,				
Chicago, Bonds	2,000,000	1,000	—	101
Essex and Hudson Gas Co.	6,500,000	—	39	40
Fort Wayne	2,000,000	—	—	—
" Bonds	2,000,000	—	55	—
Grand Rapids Gas Light Co.,				
1st Mtg. 5's	1,225,000	1,000	104¾	105
Hartford	750,000	25	190	200
Hudson County Gas Co., of				
New Jersey	10,500,000	—	113	113¾
" Bonds, 5's	10,500,000	—	108	108¾
Indianapolis	2,000,000	—	60	70
" Bonds, 5's	2,650,000	—	104½	105
Jackson Gas Co.	250,000	50	82	—
" 1st Mtg. 5's	290,000	1,000	97	100
Kansas City Gas Light Co.,				
of Missouri	5,000,000	100	—	86
Bonds, 1st 5's	3,822,000	1,000	102	104
Laclede Gas Co., St. Louis.	10,000,000	100	105	105½
Preferred	2,500,005	100	94¾	102
Bonds	10,000,000	1,000	102¾	103
Lafayette Gas Co., Ind.	1,000,000	100	—	60
Bonds	1,000,000	1,000	60	65
Louisville	2,570,000	50	143	145
Madison Gas and Electric Co.				
" 1st Mtg. 6's	350,000	1,000	108	108¾
" 6 per cent. scrip,				
due 1910	100,000	25	60	60½
Massachusetts Gas Companies, of Boston	25,000,000	100	88	88½
Preferred	25,000,000	100	94	—
Montreal Gas Co., Canada	2,000,000	100	218	218¾
Nashville Gas Light Co.	1,000,000	100	110	—
Newark, N. J., Con. Gas Co.	6,000,000	—	56	58
Bonds, 6's	6,000,000	—	137	138
New Haven Gas Co.	2,000,000	25	200	—
Peoples Gas Lt. & Coke Co.,				
Chicago	25,000,000	100	105½	105¾
1st Mortgage	20,100,000	1,000	—	—
2d "	2,500,000	1,000	104	—
Rochester Gas & Electric Co.	2,150,000	50	88	—
Preferred	2,150,000	50	118	—
Consolidated 5's	2,000,000	—	104¾	105½
San Francisco Gas Co., Cal.	15,500,000	—	—	—
St. Joseph Gas Co.—				
1st Mtg. 5's	751,000	1,000	100	102
St. Paul Gas Light Co.	1,500,000	100	45	47
1st Mortgages, 6's	650,000	1,000	113	116
Extension, 6's	600,000	1,000	112½	115
General Mortgage, 5's	2,465,000	1,000	90	95
Syracuse Gas Co., N. Y.	1,975,000	100	50	55
Bonds	2,047,000	1,000	100	104
Washington (D. C.) Gas Co.	1,600,000	200	367	370
1st Mortgage, 6's	600,000	—	—	—
Western Gas Co., Milwaukee	4,000,000	—	—	—
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NO EXTRA LABOR OR OPERATING EXPENSES.
IMPROVED AMMONIA CONCENTRATOR.
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WILLIAM A. BAEHR,
CONSULTING ENGINEER,

PEOPLES GAS BUILDING, CHICAGO.

Also Representing The Bartlett Hayward Company.

DIVIDEND NOTICE.

OFFICE OF THE UNITED GAS IMPROVEMENT CO., N. W. CORNER BROAD AND ARCH STS., PHILADELPHIA, December 14, 1910.

The Directors have this day declared a quarterly dividend of 2 per cent. (one dollar per share), payable Jan. 14th, 1911 to stockholders of record at the close of business, Dec. 31, 1910. Checks will be mailed.

1854-4 LEWIS LILLIE, Treasurer.

Position Wanted.

An experienced gas manager, now employed as manager, desires a similar position either with a natural or artificial gas company, in a city of 20,000 population or over. No preference as to location of city. Can leave present position on 30 days' notice. Results guaranteed.

Address, "A.,"
1843-tf Care this Journal.

WANTED,

Position as Manager and Superintendent of Gas Plant.

Best of references given. Fifteen years' experience in gas business. Address, "F.,"
1846-tf Care this Journal.

POSITION WANTED.

A gas manager, now employed, desires similar position in city of 15,000 population or over. Excellent record for results obtained in all departments and will refer to past and present employers. Address, "D. S. C.,"
1853-tf Care this Journal.

Position Wanted

By a practical man, 17 years' experience in the manufacture and distribution of both coal and water gas. Willing to work and capable of keeping up all works' repairs. Best results assured. Married and ready to accept position January 1, 1911. References furnished.

Address, "POSITION,"
1854-2 Care this Journal.

WANTED,

Traveling Representative by Gas Bench Manufacturer.

Man with wide acquaintance with gas companies or practical experience in gas bench design and operation, or both

1853-tf Address, "M. S.," care this Journal.

WANTED,

A man now superintendent of a coal gas plant, who wants to learn operation of by-product coke oven plant. Good future and good salary to start.

1855-2 Address, "COKE OVEN," care this Journal

WANTED,

Foreman of Gas Shop in City of 25,000 Population.

Must be a man of good habits, good manager of men, good pipe fitter, good meter repairer. State experience. Give references. Address, "W. G. & C. C.,"
1852-tf Care this Journal.

FOR SALE.

Tenders will be received for the following second-hand benchwork, up to December 31st.

Arches, 7 feet 6 inches; retorts, 14 inches by 26 inches—McIlhenny lids; need grate and bearing bars. The equipment of about 20 free-firing benches of 6's; furnaces, 12 inches to 14 inches and 28 inches deep. Mains, etc., old style. Bridge pipes, with plugs, old style. The iron in these is in good condition. For particulars, address,

L. J. MONTGOMERY,
1836-tf 150 Nassau street, New York City.

AUCTION SALE.

On Friday, January 20, 1911, at 2 o'clock P.M., the property of the McCook Gas Company will be sold at public auction to the highest bidder for cash, purchaser to assume bond indebtedness of $10,000. Plant is paying operating expenses, but present owners unable to give it personal attention. For particulars, address

THE McCOOK GAS COMPANY,
1854-2 McCOOK, NEB.

FOR SALE,

Two Sets of Purifiers, Four Boxes in Each Set.

Size, 21 ft. by 30 ft. by 3 ft. 4 in. deep; 24-in. seals; 20-in. connections; rotary center valves. Boxes are complete with covers, lifting carriages and reversible trays. All in first-class condition. GEORGE BEADENKOPF, Engineer
Consolidated Gas, Electric Light and Power Company,
1855-2 Baltimore, Md.

FOR SALE AT ATTRACTIVE PRICES.

Blowers.—2 Connersville 68 ft. d.c. to Vertical Engines; 2 McKenzie, belt; 2 positive gas Sturtevant No. 10, belt, with 2 horizontal engines; 3 Roots No. 6, 37 ft. d.c. to Vertical Engines.

Exhausters.—1 Connersville 53 ft., belt; 2 Connersville 33 ft. d.c. to Vertical Engines; 3 Wiibraham 55 ft., belt; 1 Roots 37.25 ft., direct; 2 McKenzie 25 ft., belt; 3 McKenzie 15 ft., belt; 1 McKenzie d.c. to Vertical Engine.

Engines.—1 Phœnix 11 in. by 14 in. Horizontal; two 6 in. by 6 in. Vertical; 1 Sturtevant, 4 in. by 6 in. Vertical, no wheels. (See Blowers and Exhausters.)

Flywheels.—2 C. I., 8 ft. 6 in. diameter, 26 in. face, 10-in. bore.

Station Meters.—One 9 ft. 6 in. by 9 ft. 6 in., no drum; one 9 ft. by 9 ft.; one 8 ft. 3½ in. by 8 ft.; one 8 ft. by 8 ft.

Purifiers.—4 boxes, 20 ft. by 24 ft. by 3 ft. 6 in.., with 3 covers.

Condensers.—Two Multi-tubular, 7 ft. diameter by 23 ft. 4 in.: 401 2¾-in. tubes.

Governors.—One 20-in. Automatic; one 20-in. Balanced.

Tanks.—Of various capacities and shapes.

Flanged Fittings—Miscellaneous 16 in., 20 in. and 24 in.

For further particulars apply to
THE BROOKLYN UNION GAS COMPANY,
Kent avenue and Cross street, Brooklyn, N. Y.
1848-3m

FOR SALE,

One Set of "King's Treatise on Coal Gas."

Three volumes. Edition 1882. Price, $100.

Address,
AMERICAN GAS LIGHT JOURNAL,
42 PINE STREET, NEW YORK CITY.

CHARLES F. LEONARD,

CONSULTING ENGINEER,

ST. PAUL BUILDING,
220 Broadway,
NEW YORK CITY.

TELEPHONE, - - - CORTLAND, 658.

STANDARD REDUCTION FACTORS for GASES, by Helon Brooks MacFarland, B.S., M.M.E. Price, $1.50. For Sale by American Gas Light Journal, 42 Pine Street, New York City.

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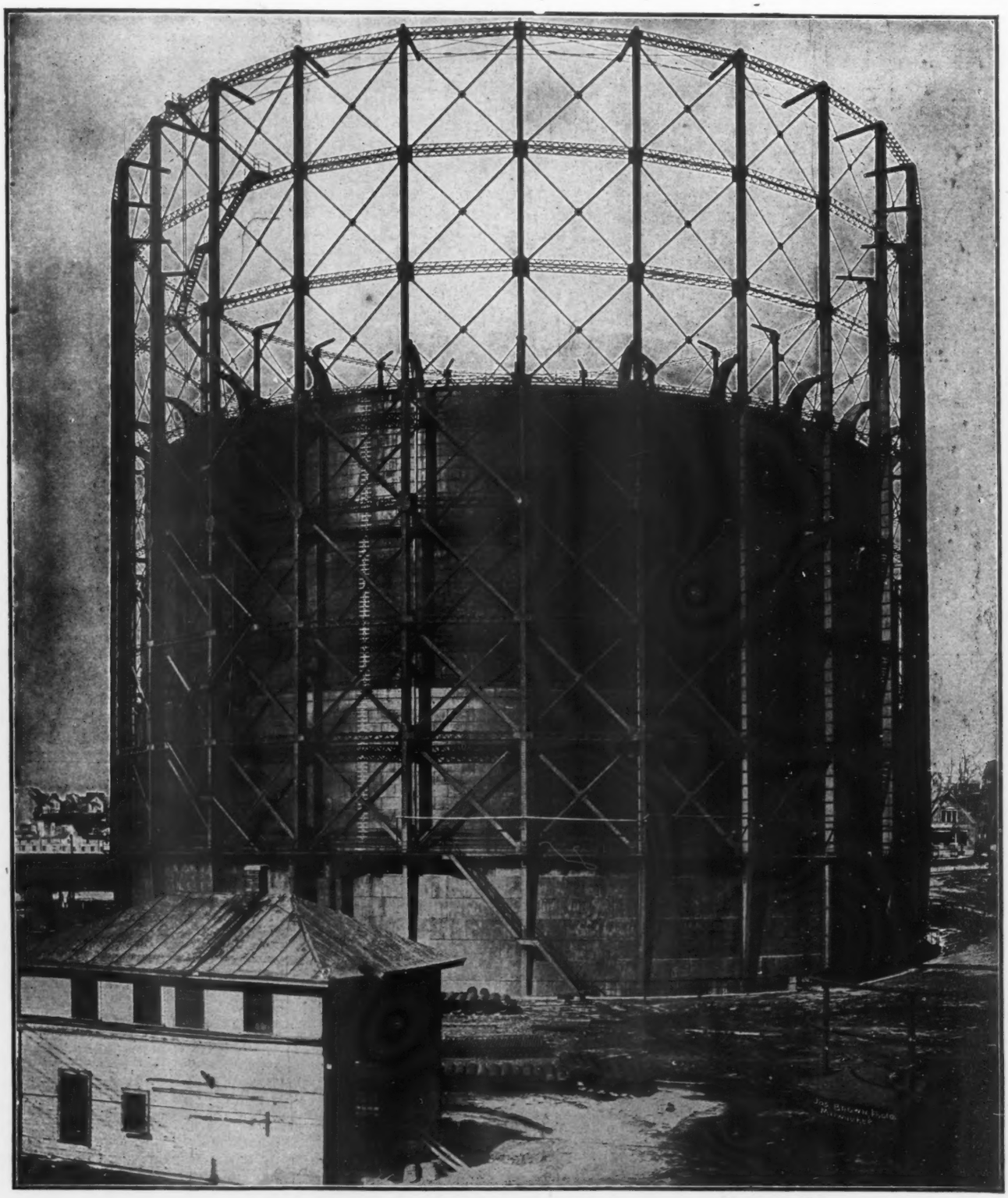

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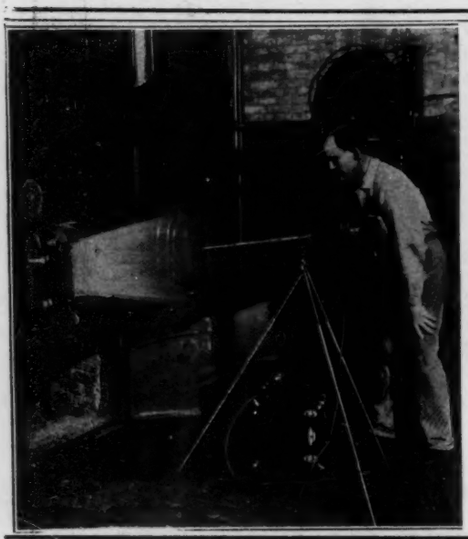

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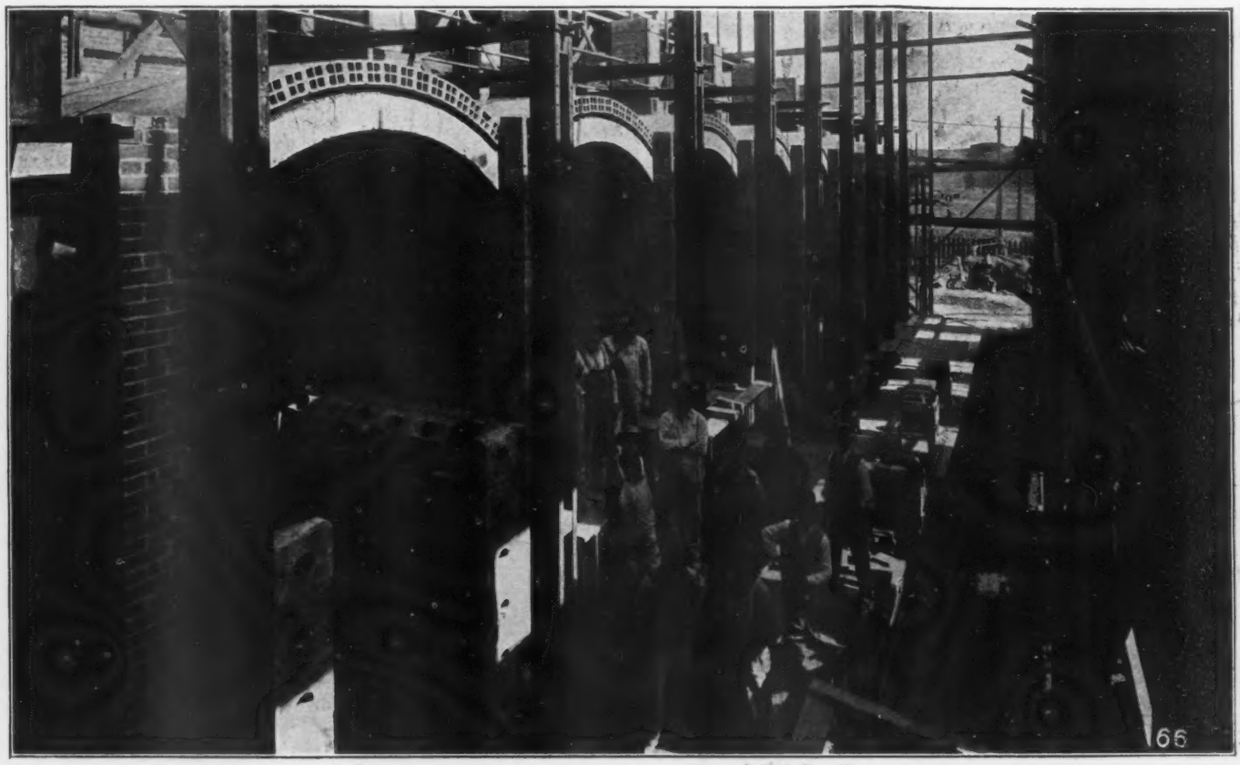

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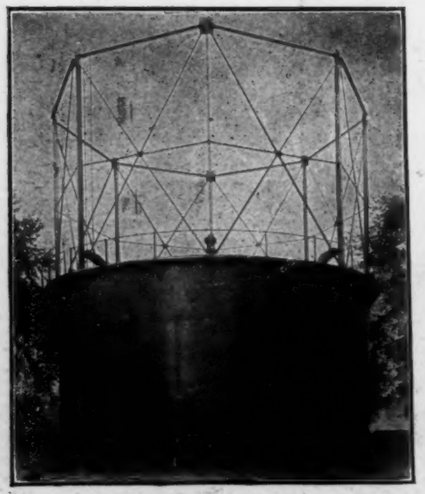

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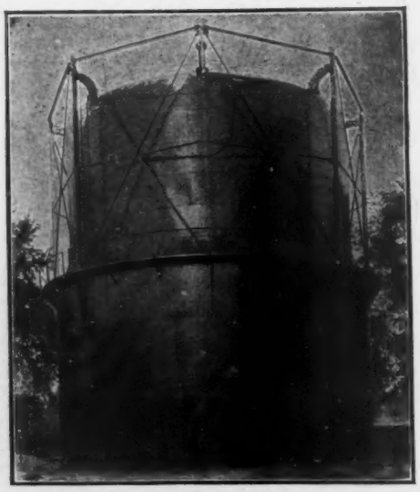

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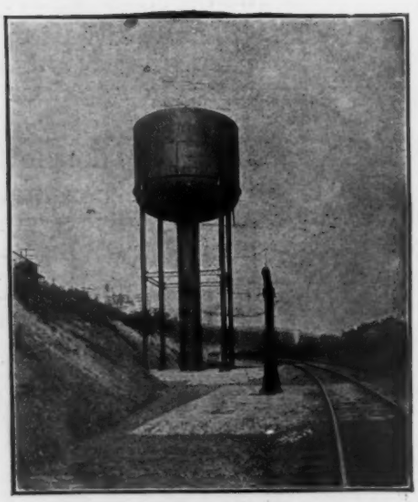

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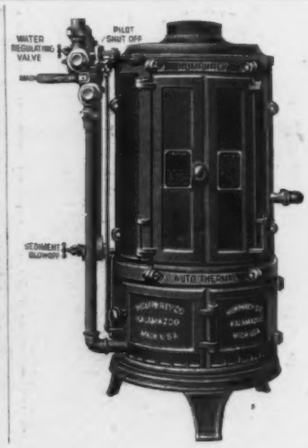

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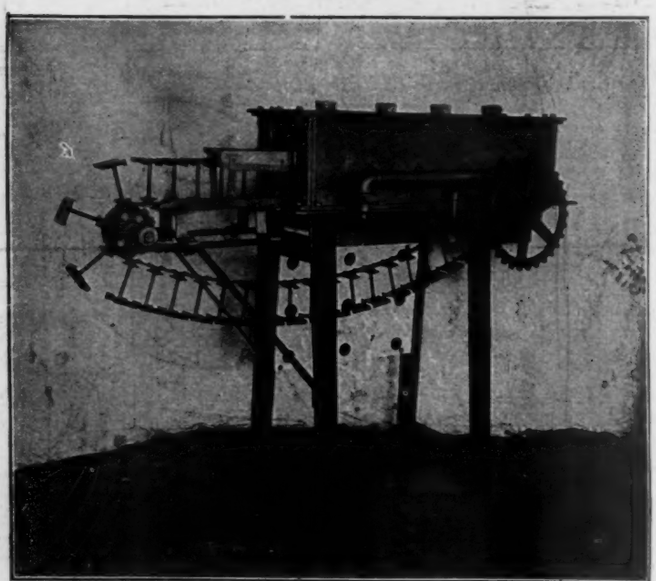

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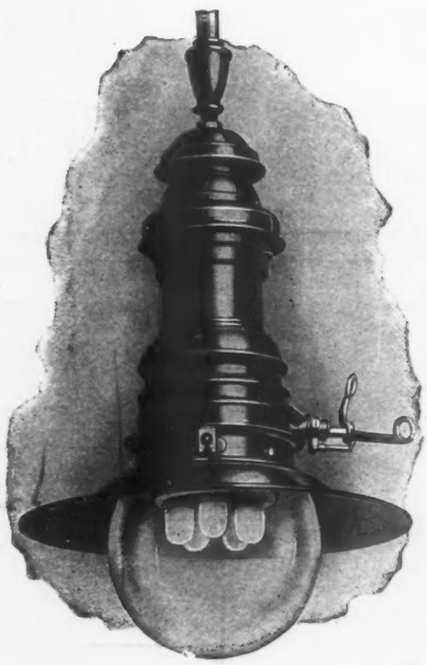

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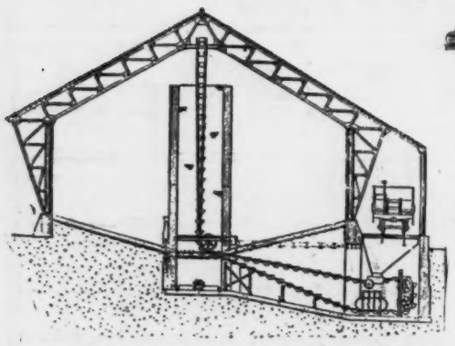

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Canadian Gas Association.—Annual meeting, June, 1911. ————. Officers President, Arthur Hewitt, Toronto, Ont.; Secretary and Treasurer, John Keillor, Hamilton, Ont.

Empire State Gas and Electric Association.—Annual meeting, Nov., 1910. New York City. Officers: President, C. R. Huntley, Buffalo, N. Y.; Secretary, C. H. B. Chapin, 29 W. 39th street. New York City.

Guild of Gas Managers of New England.—Annual meeting, December. Young's Hotel, Boston; monthly meeting, second Saturday. Officers: President, A. K. Quinn; Newport, R. I.; Secretary, Walter G. Africa, Manchester, N. H.

Illinois Gas Association.—Annual meeting, time, March, Chicago, Ills. Officers: President, A. S. Harrington, Chicago, Ill.; Secretary-Treasurer, C. B. Strohn, Elgin, Ill.

Illuminating Engineering Society.—Annual meeting, Oct., —, 1911. Meetings of Sections, monthly. President, E. P. Hyde, Cleveland, O.; Secretary, Preston S. Millar, 29 W. 39th street, N. Y. City. Sections: New York: Secretary, Albert J. Marshall, 36 West 39th street. New England, Secretary, L. D. Gibbs 39 Boylston street, Boston, Mass. Philadelphia, Secretary, F. N. Morton, Broad and Arch streets Chicago, Secretary, F. H. Bernhard, Marquette Building.

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Iowa District Gas Association.—Annual meeting, time, June, 1911, ————. Officers: President, Austin Hurt, Waterloo, Ia.; Secretary and Treasurer, G. I. Vincent, Des Moines, Ia.

Kansas Gas, Water and Electric Light Association.—Annual meeting, time, ———— Wichita, Kas. Officers: President, W. A. Scothorn, Hutchinson, Kas.; Secretary and Treasurer, J. D. Nicholson, Newton, Kas.

Michigan Gas Association.—Annual meeting, time, Sept. 1911; Detroit, Mich. Officers: President, A. P. Ewing, Detroit, Mich.; Secretary-Treasurer, Glenn R. Chamberlain, Grand Rapids, Mich.

Missouri Electric Light, Gas, Water Works and Street Railway Association.—Annual meeting, April 13, 14 and 15, 1911; St. Louis, Mo. Officers: President, R. J. Irvine; Secretary and Treasurer, W. J. Cunningham, Springfield, Mo.

National Commercial Gas Association.—Annual meeting, December 5-12, 1911. Denver, Officers: President, C. N. Stannard, Denver; Secretary, Louis Stotz, 29 West 39th street, New York City.

Natural Gas Association.—Annual meeting, May 16, 17 and 18, 1911; Pittsburgh, Pa. Officers: President, John M. Garard, Columbus, O. Secretary, T. C. Jones, Delaware, O. Editor Wrinkle Department, F. W. Stone, Ashtabula, O.

New England Gas Association.—Annual meeting, third Wednesday in February, 1911; Boston. Officers: President, W. H. Snow, Holyoke, Mass.; Secretary-Treasurer, N. W. Gifford, East Boston, Mass.

Oklahoma Public Utilities Association.—Annual meeting, May 9, 10 and 11, 1911. Officers: President, E. C. Reynolds; Secretary, Galen Crow, Guthrie, Okla.

Pacific Coast Gas Association.—Annual meeting, Sept. 20, 21 and 22, 1911, Oakland, Cal. Officers: President, F. A. Leach, Jr., Oakland, Cal.; Vice-President, W. Baurhyte, Los Angeles, Cal.; Secretary-Treasurer, John A. Britton, 925 Franklin street, San Francisco, Cal.

Pennsylvania Gas Association.—Annual meeting, April, 1911, Reading, Pa. Officers President, J. H. Keppelman, Reading, Pa.; Secretary-Treasurer, William H. Merritt, Lebanon, Pa.

Society of Gas Lighting.—Annual meeting, December, 1911; monthly meeting, second Thursday. Place, New York City. Officers: President, Fred. S. Benson; Secretary, George G. Ramsdell, Waterbury, Conn.

Southern Gas Association.—Annual meeting, April 19-21, 1911, Montgomery, Ala. Officers: President, H. W. Frund, Salisbury, N. C.; Secretary-Treasurer, Jas. Ferrier, Rome, Ga.

Southwestern Electrical and Gas Association.—Annual meeting. May, 1911, ———— Tex. Officers: President, W. B. Tuttle, San Antonio, Tex.; Secretary, H. B. Head, Stephensville, Tex.

Wisconsin Gas Association.—Annual meeting, May ————, 1911, Milwaukee, Wis. Officers: President, W. H. Winslow, Superior, Wis.; Secretary-Treasurer, Henry Harmon, Milwaukee, Wis.

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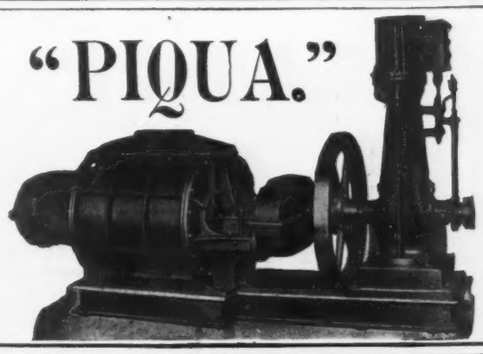

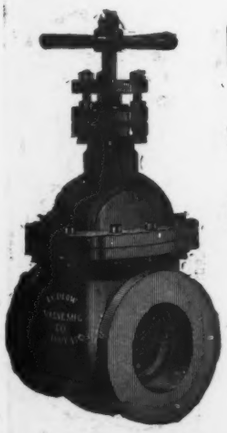

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[COMMUNICATED BY THE AMERICAN METER COMPANY.]

Day of Week.	MOONLIGHT SCHEDULE.		
	Date.	Light.	Extinguish.
Sunday	1	5.20 P.M.	6.20 A.M.
Monday	2	5.20	6.20
Tuesday	3	5.20	6.20
Wednesday	4	5.20	6.20
Thursday	5	8.50	6.20
Friday	6	10.00	6.20
Saturday	7	11.10 F.Q.	6.20
Sunday	8	12.20 A.M.	6.20
Monday	9	1.30	6.20
Tuesday	10	2.50	6.20
Wednesday	11	4.10	6.20
Thursday	12	5.20	6.20
Friday	13	No L.	No L.
Saturday	14	No L. F.M.	No L.
Sunday	15	No L.	No L.
Monday	16	5.30 P.M.	8.00 P.M.
Tuesday	17	5.30	9.10
Wednesday	18	5.30	10.20
Thursday	19	5.30	11.30
Friday	20	5.30	12.30 A.M.
Saturday	21	5.30 L.Q.	1.30
Sunday	22	5.40	2.30
Monday	23	5.40	3.30
Tuesday	24	5.40	4.30
Wednesday	25	5.40	5.30
Thursday	26	5.40	6.10
Friday	27	5.40	6.10
Saturday	28	5.40	6.10
Sunday	29	5.50 N.M.	6.10
Monday	30	5.50	6.10
Tuesday	31	5.50	6.10

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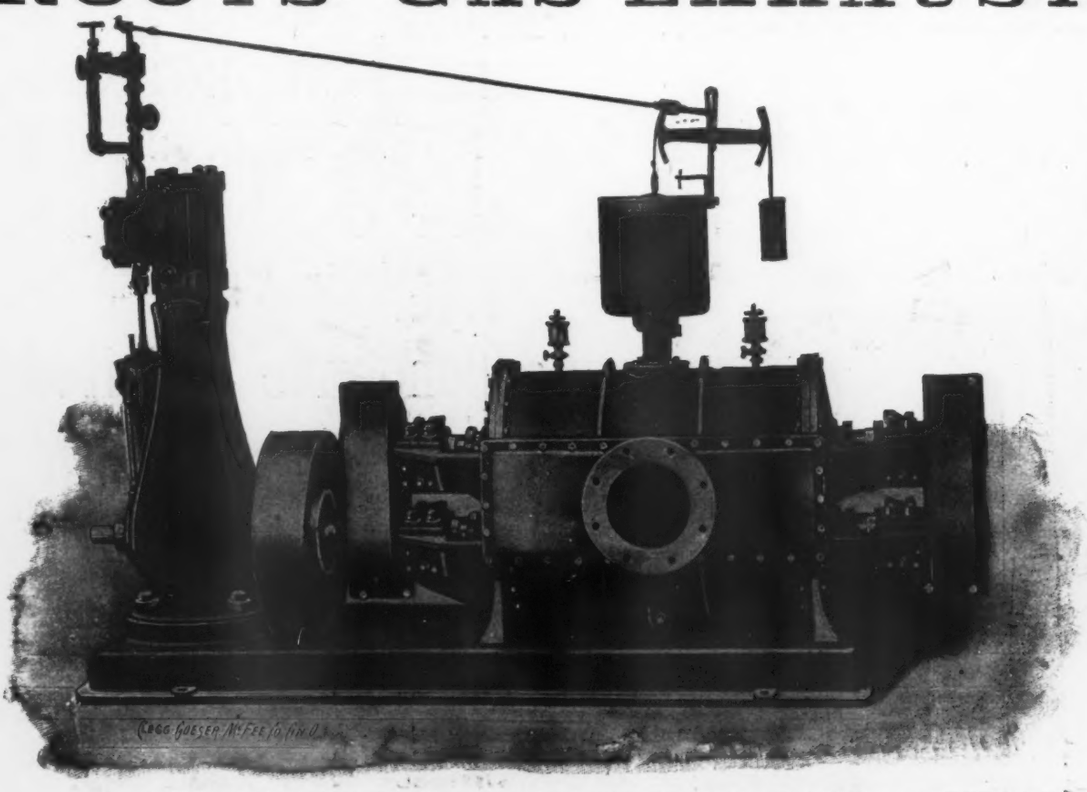

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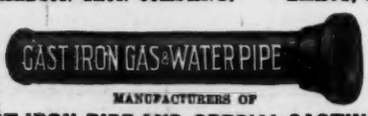

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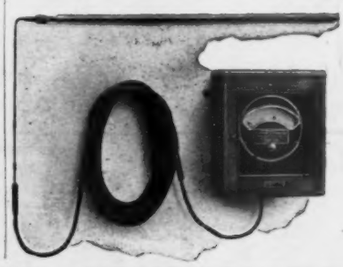

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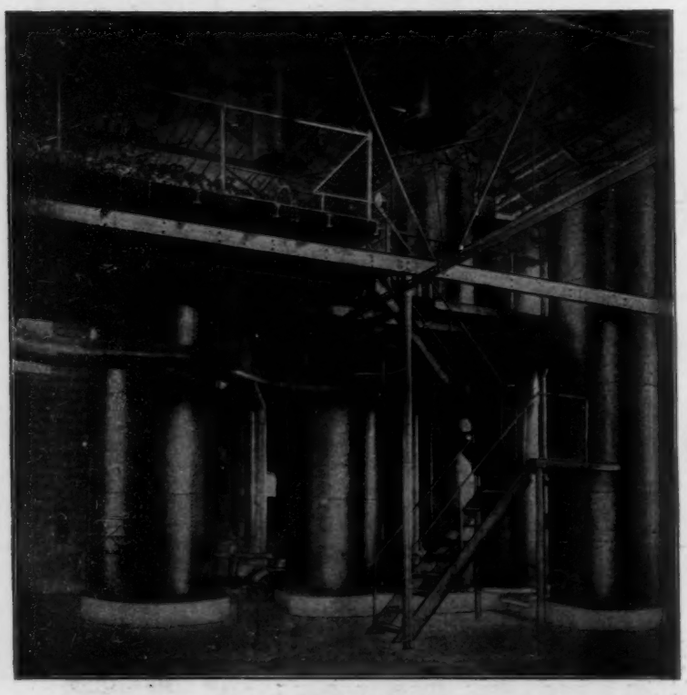

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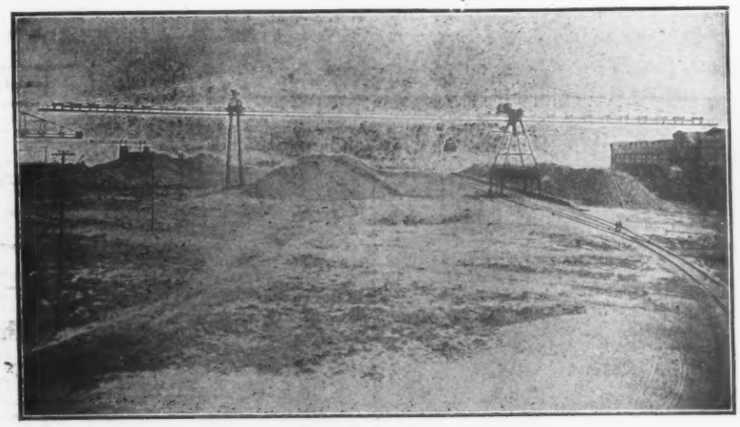

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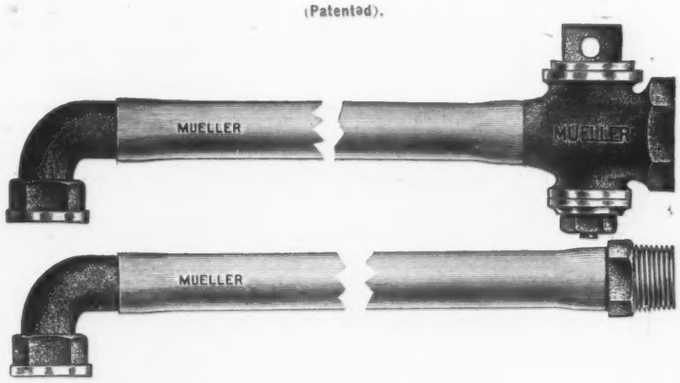

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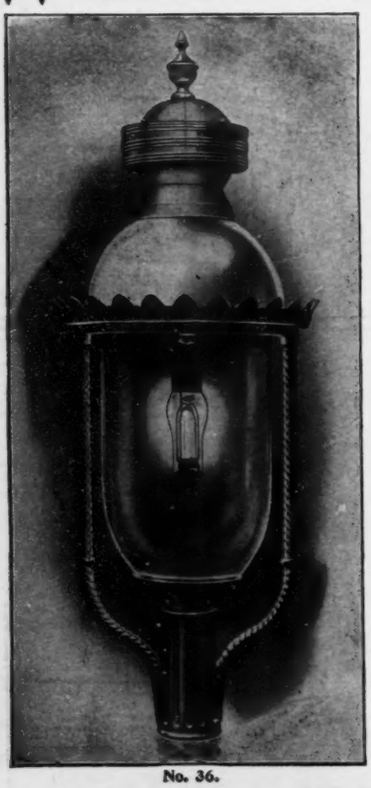

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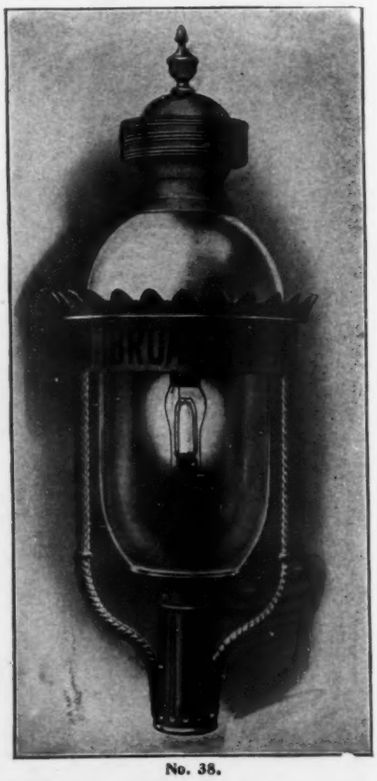

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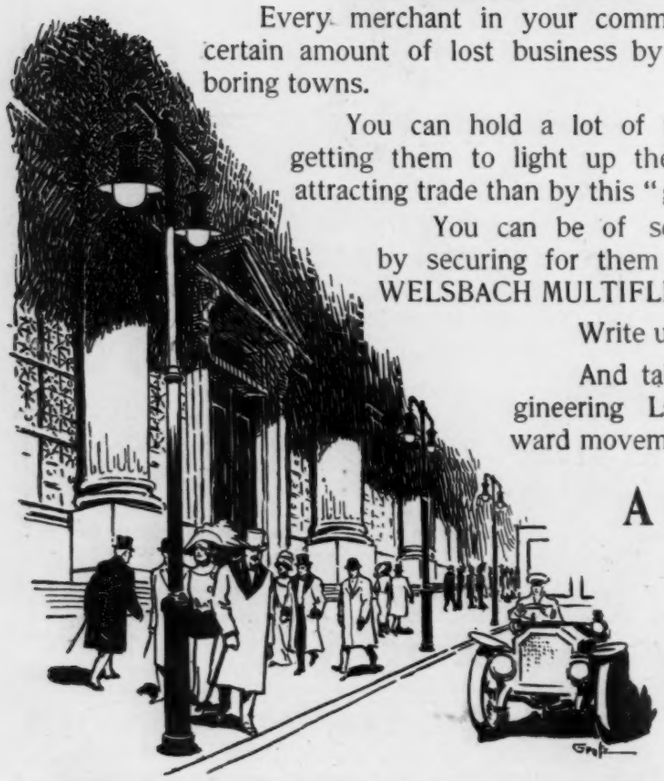

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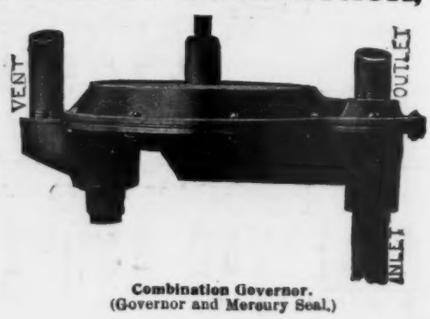

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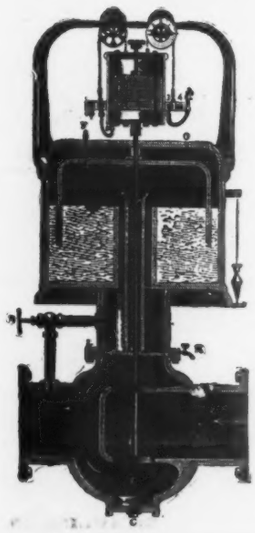

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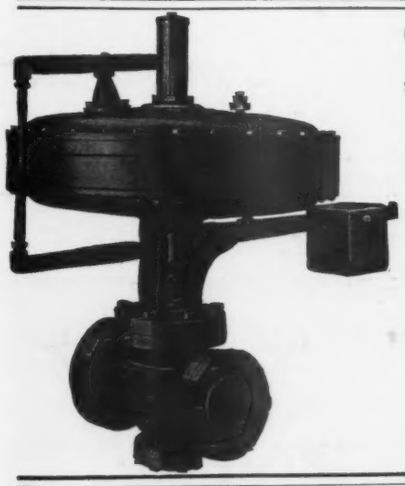

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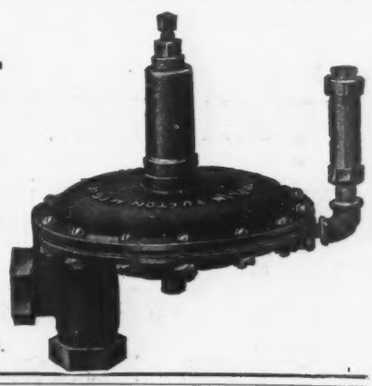

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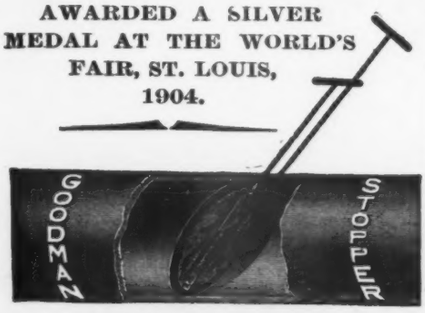

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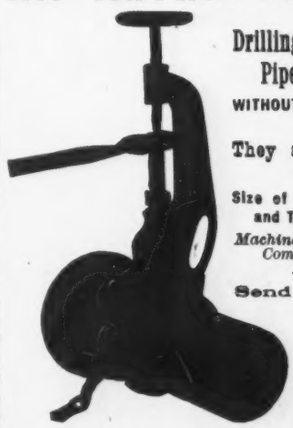

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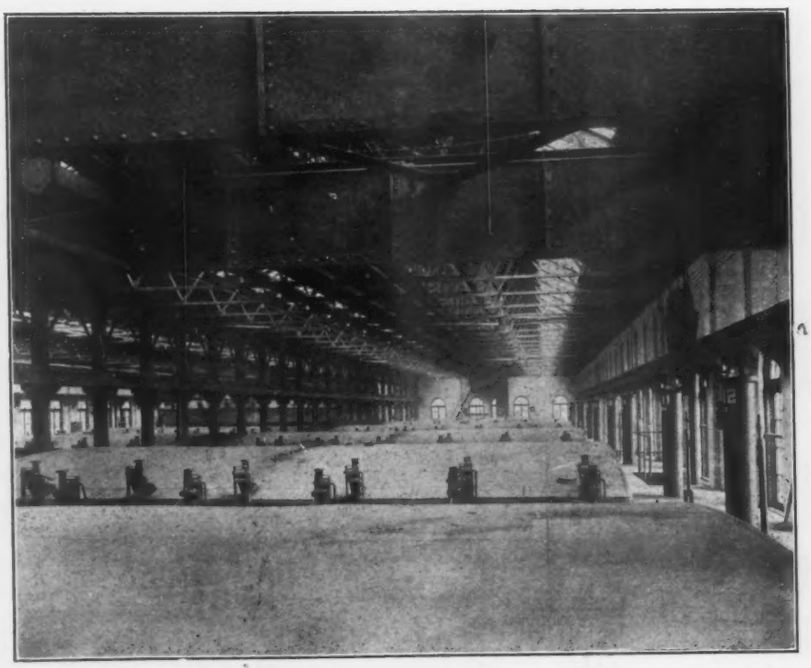

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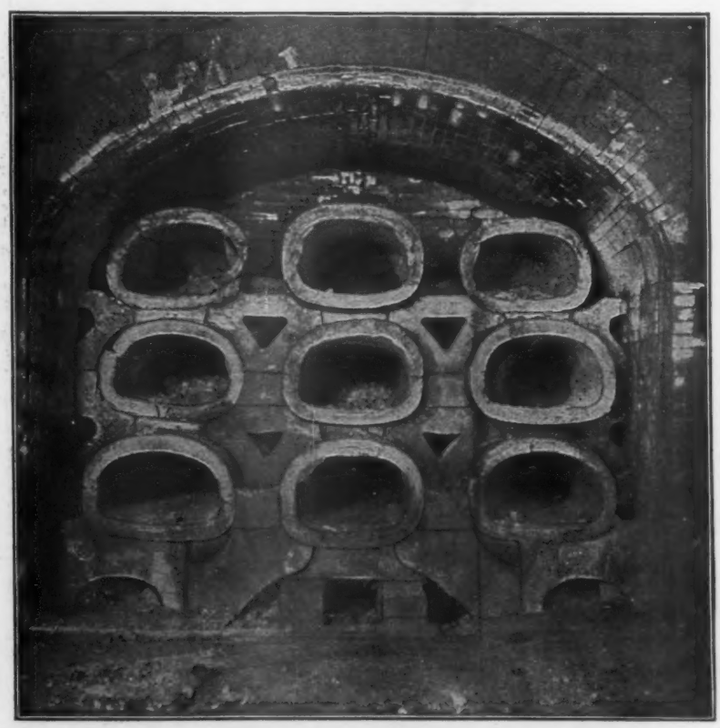

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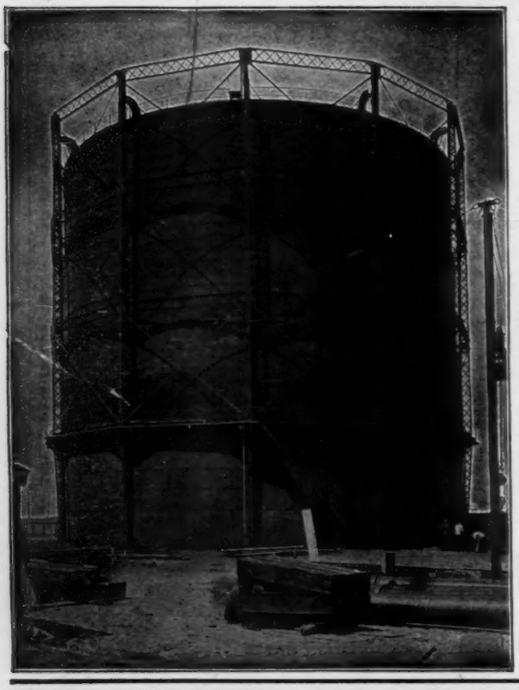

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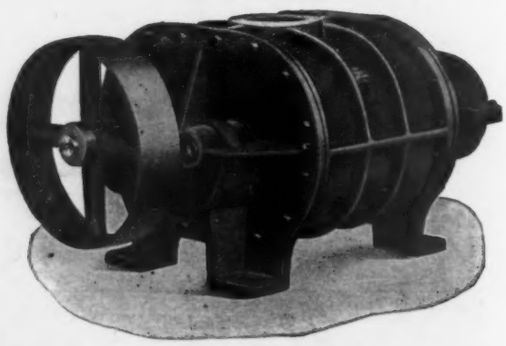

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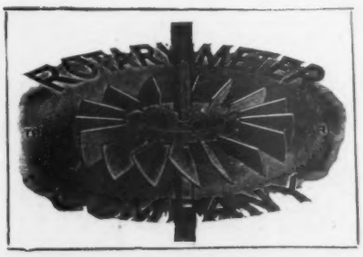

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